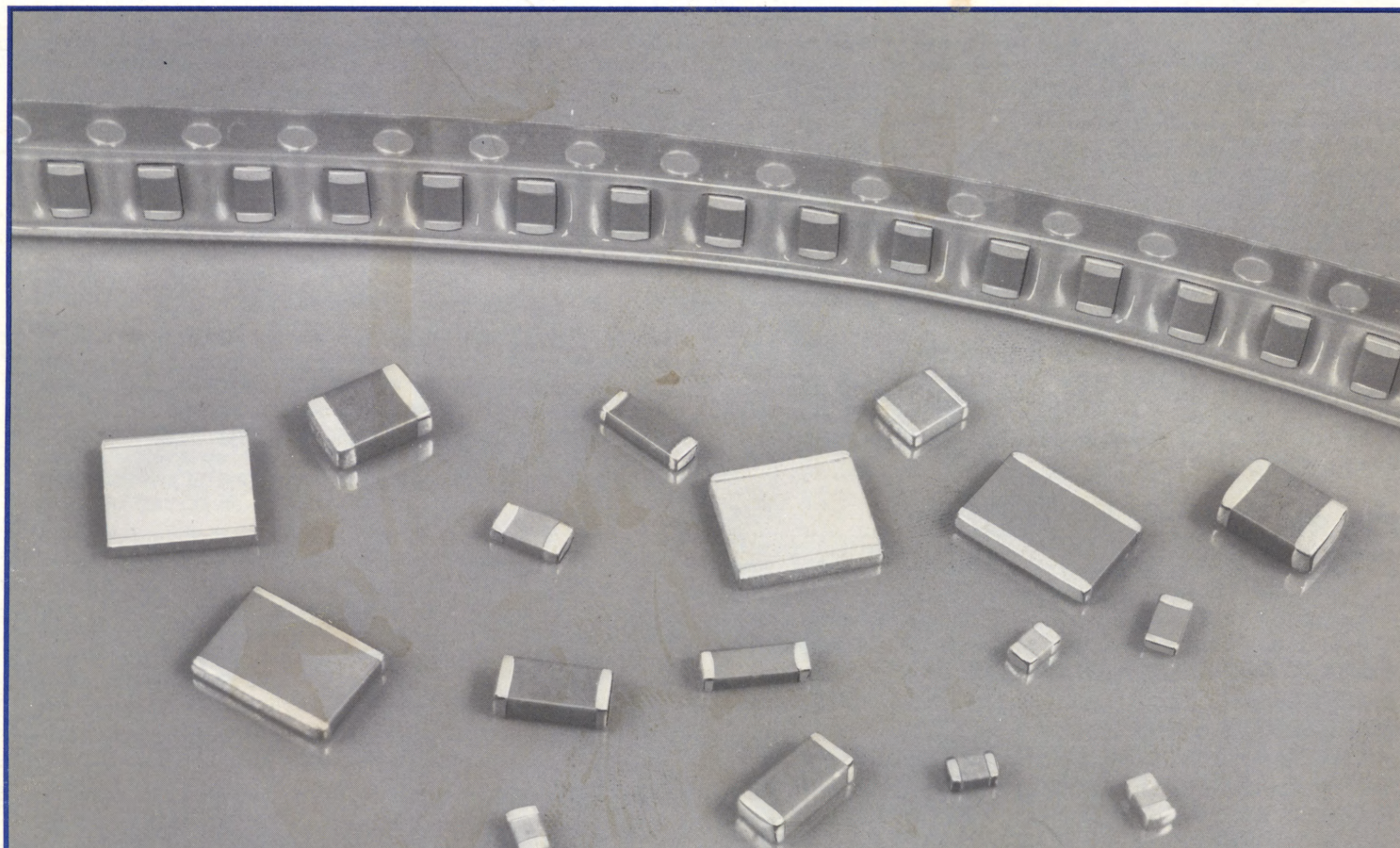
KEMET®

MULTILAYER CERAMIC CHIP CAPACITORS



INCLUDING MILITARY RATINGS PER MIL-C-55681, HIGH RELIABILITY— GR900 AND MIL-C-123.

F-2096F 9/91

INDEX

KEMET Electronics Corporation, P.O. Box 5928, Greenville, S.C. 29606, (803) 963-6300

KEMET®

GENERAL INFORMATION

The ceramic chip consists of formulated ceramic dielectric materials in layers interspersed with metal electrode layers. The entire structure is fired at high temperature, after which conductive terminations are applied on opposite ends to contact protruding electrode edges. Chips are then terminated with materials suitable for surface mount application.

KEMET multilayer ceramic chip capacitors are produced in a plant designed specifically for chip capacitor manufacture. The process features a high degree of mechanization as well as precise controls over raw materials and process conditions. Manufacturing is supplemented by extensive Technology, Engineering and Quality Assurance programs. Extensive application in aerospace and military programs attests to the reliability of KEMET chip capacitors.

KEMET ceramic chip capacitors are offered in the three most popular temperature characteristics. These are designated by the Electronics Industry Association (EIA) as the ultra-stable C0G (known in the vernacular as NPO), the stable X7R (military BX or BR), and the general purpose Z5U. A wide range of sizes are available to provide capacitance from 1 picofarad through 2.2 microfarads in 50, 100, and 200 volt ratings. KEMET Multilayer Ceramic Chip Capacitors are also available in KEMET's tape and reel packaging, compatible with automatic placement equipment.

TEMPERATURE CHARACTERISTICS

Specified electrical limits for the three principal temperature characteristics are shown below. Electrical stability with respect to temperature and voltage is related inversely to the packaging efficiency (capacitance × voltage in a given case size). C0G is made from ceramic materials which are not ferroelectric, yielding superior stability but low packaging efficiency. Both X7R and Z5U capacitors are made from materials which are ferroelectric, such as barium titanate. This material changes crystalline form at its Curie point of approximately 125°C. The change in structure causes a radical change in the inherent dielectric constant, directly affecting the exhibited capacitance. Other materials in the ceramic formulations modify this effect to different degrees in producing the X7R and Z5U characteristics.

AGING

Ferroelectric materials, which give X7R & Z5U characteristic ceramic capacitors their high dielectric constant, exhibit a phenomenon called aging. It is somewhat similar to annealing in metals and results in a very gradual decrease with time of the dielectric constant and capacitance. The rate of aging is affected by both the temperature and the applied voltage experienced by the capacitor. As a rule of thumb, X7R chip capacitors exhibit a capacitance loss of about 1.0% for every decade of hours of life, for example:

100 hours = 1.00 μF
1000 hours = 0.990 μF
10,000 hours = 0.980 μF, etc.

and Z5U characteristic parts exhibit an aging rate of about 5% per hour decade. Heating the capacitor above about 125°C, (for example, in wave soldering) will moderately increase the capacitance and tend to "reset the clock."

Aging rates are utilized in testing KEMET capacitors prior to shipment. Capacitance test limits are designed to bring capacitors within the specified tolerance at 1,000 hours, allowing a nominal 14 weeks for receipt and use by the customer. This is a matter of convenience for the customers' incoming inspection, for the capacitance will continue to decline with time.

VOLTAGE EFFECTS

Ferroelectric materials are also affected by applied voltage, both alternating and direct. Low values of voltage produce a slight increase in capacitance and dissipation factor. Higher voltages cause a decrease in capacitance which may become quite large. Typically, capacitors with X7R characteristic decrease in capacitance by approximately 10% when rated DC voltage is applied. Z5U capacitors decrease in capacitance by about 60%.

A small portion of the decrease in capacitance by the application of a high DC voltage persists after the voltage is removed and then disappears gradually.

CUSTOMER TESTING

Because of the temperature and voltage effects, caution must be used in establishing a testing sequence. Dielectric strength and insulation resistance tests both apply high DC voltage and depress capacitance, so capacitance should be measured prior to these tests.

SPECIFIED ELECTRICAL LIMITS

PARAMETER	TEMPERATURE CHARACTERISITICS		
	C0G	X7R	Z5U
Dissipation Factor: Measured at following conditions: C0G — 1 kHz and 1 vrms if capacitance >100 pF 1 MHz and 1 vrms if capacitance ≤100 pF X7R — 1 kHz and 1 vrms Z5U — 1kHz and 0.5 vrms	0.10%	2.5%	3.0%
Dielectric Strength: At 2.5 times rated DC voltage.	Pass Subsequent IR Test		
Insulation Resistance (IR): At rated DC voltage, whichever of the two is smaller.	1,000 MΩ-μF or 100 GΩ	1,000 MΩ-μF or 100 GΩ	1,000 MΩ-μF or 10 GΩ
Temperature Characteristic: Range, °C Capacitance Change without DC voltage	-55 to 125 0 ± 30 ppm/°C*	-55 to 125 ± 15%	+10 to 85 +22%, -56%

*±60 ppm °C below 10 pf nominal.
+53 ppm -30 ppm/°C from +25°C to -55°C comparable to MIL-C-20.

PERFORMANCE CHARACTERISTICS

GENERAL

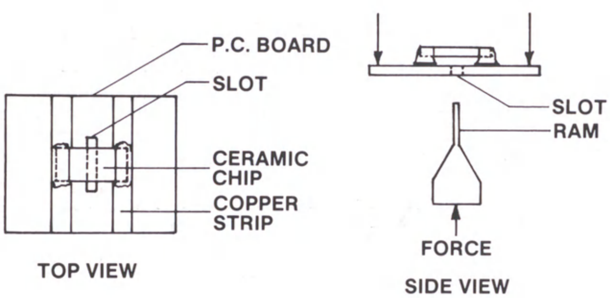
Working Voltage:
C0G — 50, 100 & 200 Volts
X7R — 50, 100 & 200 Volts
Z5U — 50 & 100 Volts

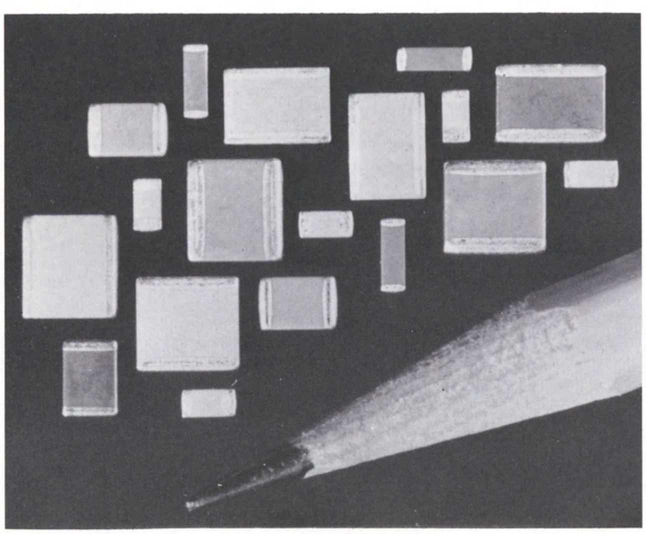
Temperature Characteristics:
C0G — 0 ±30 PPM/°C from −55°C to +125°C (±60 PPM below 10 pF)
X7R — ±15% from −55°C to +125°C
Z5U — +22%; −56% from +10°C to +85°C

Capacitance Tolerance:
C0G — ±0.5 pF, ±1%, ±2%, ±5%, ±10%, ±20% (±0.5 pF is tightest available tolerance)
X7R — ±10%, ±20%, −0 + 100%, −20% + 80%, ±5% available upon special request
Z5U — ±20%, −0 + 100%, −20 + 80%

Construction:
Monolithic block of ceramic dielectric with interdigitated internal electrodes and an exterior metallization on each end, as shown below.

Terminal Strength:
Chips soldered to an epoxy-glass substrate with Sn62 solder and tested as shown in Figure 1 exhibit no visual evidence of mechanical damage or other anomalies with the exertion of a force of 1 Kg.





ELECTRICAL

Capacitance: Within specified tolerance when measured with 1 volt rms at 1 KHz (100 pF or less at 1 MHz for C0G). Z5U measured with 0.5 volt rms.

Dissipation Factor: 25°C at 1 KHz (1000 pF or less at 1 MHz for C0G)
C0G — .10% Maximum
X7R — 2.5% Maximum
Z5U — 3.0% Maximum

Insulation Resistance: after 2 minutes electrification at 25°C and rated voltage
C0G — 100K megohms or 1000 megohm — μF, whichever is less.
X7R — 100K megohms or 1000 megohm — μF, whichever is less.
Z5U — 10K megohms or 1000 megohm — μF, whichever is less.

Dielectric Withstanding Voltage:
250% of rated voltage for 5 seconds with current limited to 50 mA at 25°C.

Aging Rate:
% ΔC/Decade Hour, Maximum
C0G — 0%
X7R — 2.5%
Z5U — 5.0%

Life Test:
1000 hours at 200% of rated voltage at 125°C (Except 150% of rated voltage at 85°C for Z5U). Post-Test limits at 25°C are:

Capacitance Change:
C0G — less than 2% or 0.5 pF, whichever is higher
*X7R — ±15% of initial value.
*Z5U — ±30% of initial value.

Dissipation Factor:
C0G — .25% maximum
X7R — 2.5% maximum
Z5U — 3.0% maximum

Insulation Resistance:
C0G — 10K megohms or 100 megohm — μF, whichever is less.
X7R — 10K megohms or 100 megohm — μF, whichever is less.
Z5U — 1K megohms or 100 megohm — μF, whichever is less.

Dielectric Withstanding Voltage:
250% of rated voltage for 5 seconds with current limited to 50 mA.

*NOTE: X7R & Z5U dielectrics exhibit aging characteristics. Therefore, it is highly recommended that capacitors be deaged for 2 hours at 150° C and stabilized at room temperature for 48 hours before capacitance measurements are made.

PERFORMANCE CHARACTERISTICS (Cont'd)

ENVIRONMENTAL

Moisture Resistance:

MIL-STD-202, Method 106, 20 cycles with 50 volt applied. Post-Test limits at 25°C are:

Insulation Resistance:

C0G — 10K megohms or 100 megohm — μF, whichever is less.

X7R — 10K megohms or 100 megohm — μF, whichever is less.

Z5U — 1K megohms or 100 megohm — μF, whichever is less.

Dielectric Withstanding Voltage:

250% of rated voltage for 5 seconds with current limited to 50 mA.

Immersion Cycling:

MIL-STD-202, Method 104, Condition B. Post-Test limits at 25°C are:

Insulation Resistance:

C0G — 10K megohms or 100 megohm — μF, whichever is less.

X7R — 10K megohms or 100 megohm — μF, whichever is less.

Z5U — 1K megohms or 100 megohm — μF, whichever is less.

Dielectric Withstanding Voltage:

250% of rated voltage for 5 seconds with current limited to 50 mA.

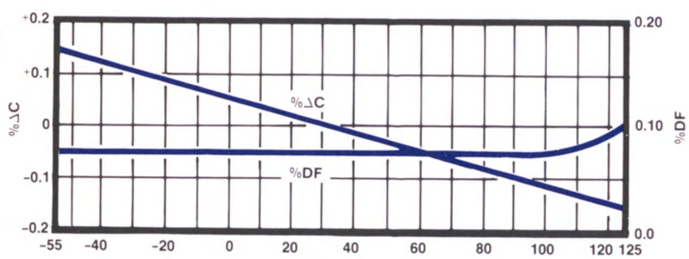
Solderability:

MIL-STD-202, Method 208, (245°C, 5 secs, Sn62 solder) 95% smooth solder on terminations post test.

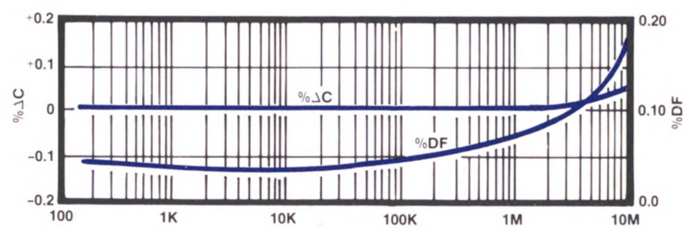
Resistance to Soldering Heat:

MIL-STD-202, Method 210, Condition B (260°C, 10 secs), Procedure 2 (Mounted on substrates and then floated on the solder surface). Post-Test Requirements: No visual evidence of mechanical damage or delamination or exposed electrodes.

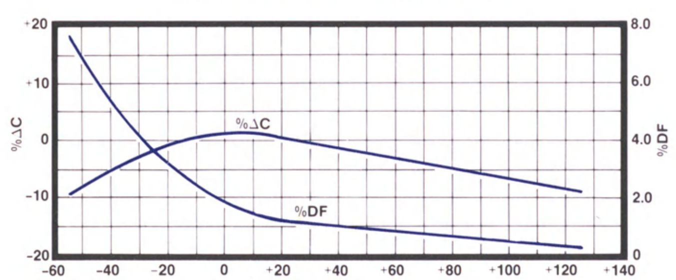
TYPICAL PERFORMANCE CURVES



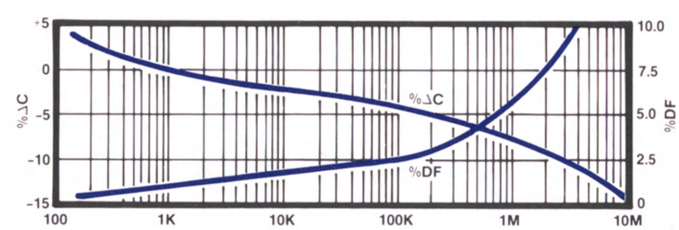
Temperature °C
Capacitance & DF vs. Temperature-C0G



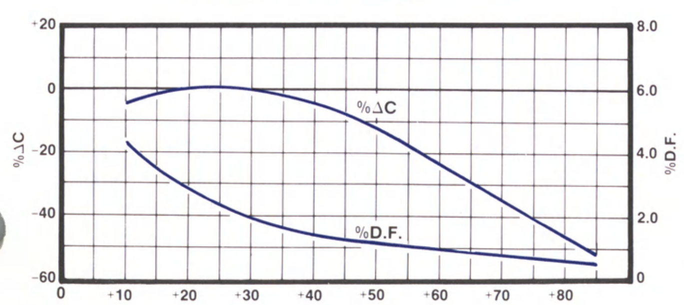
Frequency-Hertz
Capacitance & DF vs. Frequency-C0G



Temperature °C
Capacitance & DF vs. Temperature-X7R

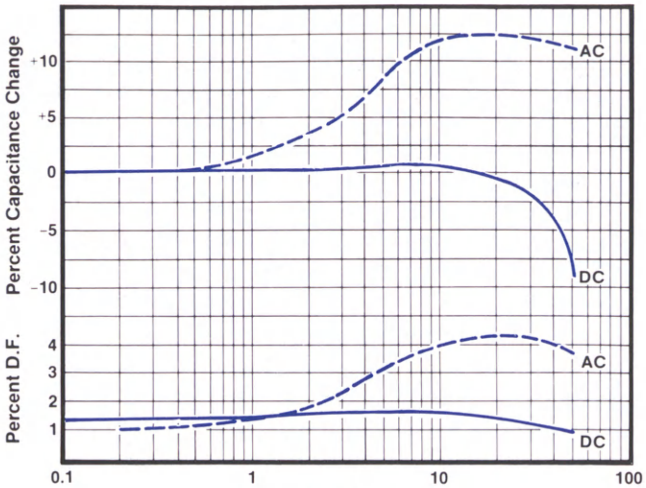


Frequency-Hertz
Capacitance & DF vs. Frequency-X7R & Z5U

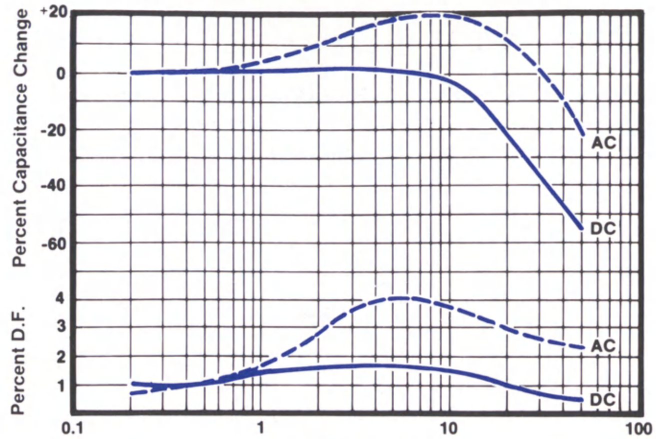


Temperature °C
Capacitance & DF vs. Temperature-Z5U

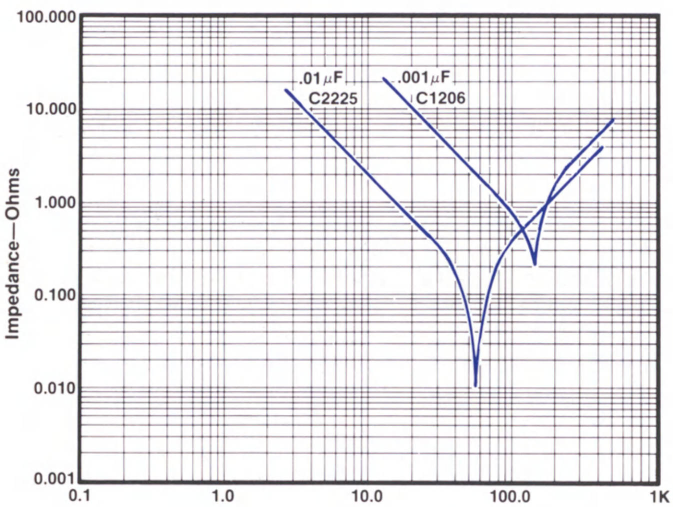
TYPICAL PERFORMANCE CURVES (Cont'd)



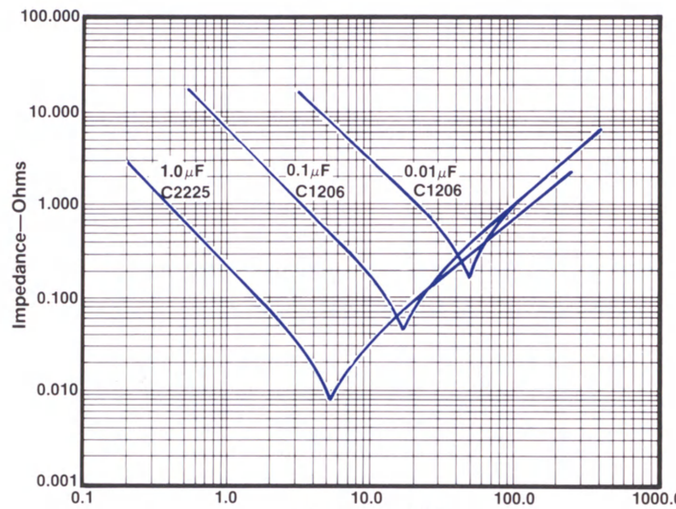
AC or DC Volts Applied
Typical Effect of 1000 Hz AC and DC Voltage Level on Capacitance and Dissipation Factor — X7R
Note: C0G Dielectric capacitance and dissipation factor are stable with voltage.



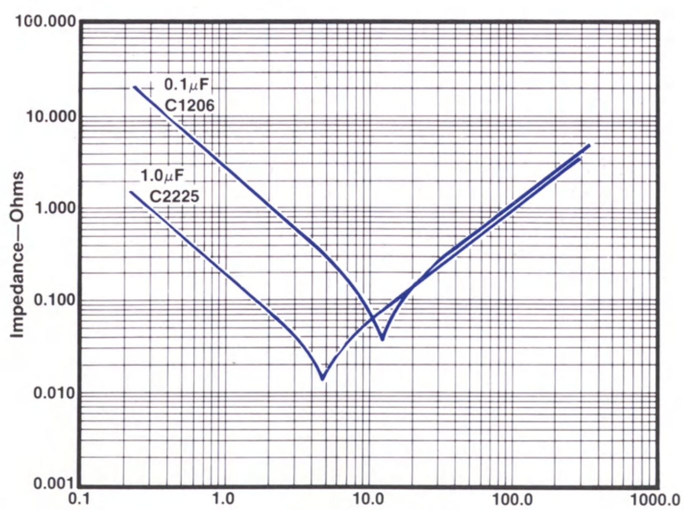
AC or DC Volts Applied
Typical Effect of 1000 Hz AC and DC Voltage Level on Capacitance and Dissipation Factor — Z5U
Note: C0G Dielectric capacitance and dissipation factor are stable with voltage.



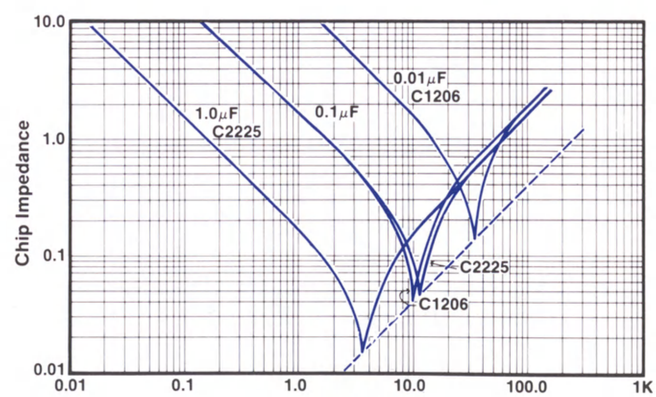
Frequency—MHz
Impedance vs. Frequency for Ceramic Chip Capacitors—C0G Dielectric



Frequency—MHz
Impedance vs. Frequency For Ceramic Chip Capacitors — X7R Dielectric



Frequency — MHz
Impedance vs. Frequency for Ceramic Chip Capacitors — Z5U Dielectric



Frequency — KHz
Effect of Chip Size on Impedance vs. Frequency Characteristic

RECOMMENDATIONS FOR SURFACE MOUNTING

1. Storage and Handling of Chip Capacitors.

As with other components having solder or tin coated terminals, care in storage is important to maintaining a readily wetted surface. The following are recommended:

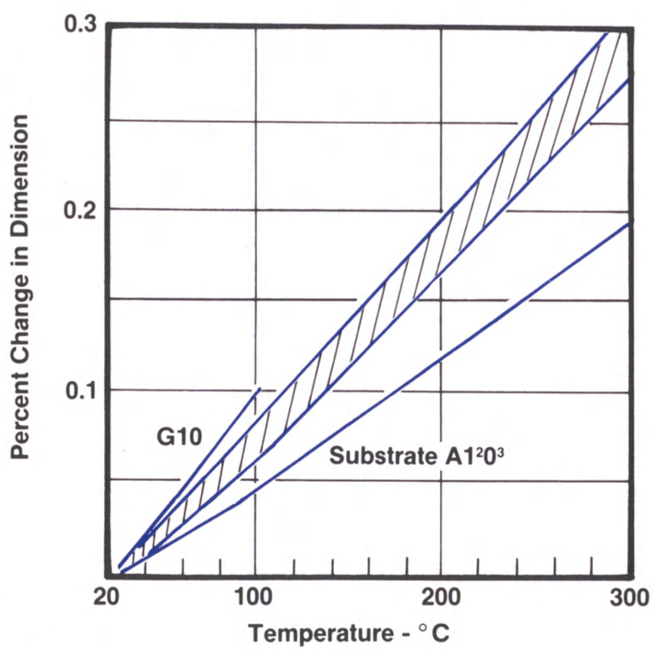
(a) Use a cool, dry environment free of corrosive fumes for long-term storage. When possible, keep the parts in their original packaging, unopened prior to use.

(b) Use finger protection when handling parts to avoid contaminating the metallized and dielectric surfaces. Both solderability and insulation resistance can be affected by body oils and perspiration.

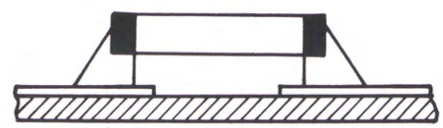
(c) Minimize residence times in vibratory bowl feeders and other mechanically agitated reservoirs to avoid both contaminating the metallized surfaces and transferring metal onto the dielectric faces.

2. Solder Fillets and Land Design

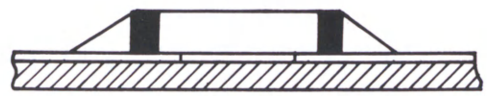
A series of mechanical considerations affect the satisfactory application of a ceramic capacitor chip or any other surface mounted component. The coefficient of thermal expansion of ceramic capacitor chips lies between that of epoxy-glass circuit board and substrate alumina. See Figure 2.



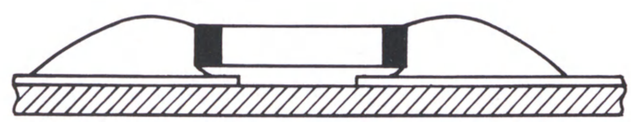
As a result of temperature excursions after solidification of the attachment solder, significant dimensional mismatches occur between the ceramic chip and its substrate. These must be absorbed by the solder fillet to avoid damage to the chip and its termination, or delamination of the metallization from the substrate. A desirable solder fillet configuration permits the absorption of strain to the extent possible, as shown below in the first diagram. The two following diagrams show undesirable mounting and fillets.



Desirable

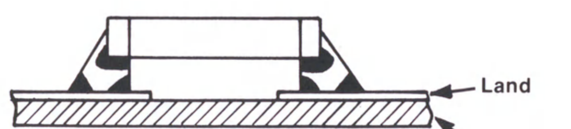


Undesirable - Chip too close to substrate



Undesirable - Too much solder

Specifics of the land designs vary with each particular application. However, solder resists are often used to minimize unwanted solder. It is desirable for the solder fillet to extend about half way up the chip termination. More coverage is normally unnecessary, because the top of the fillet is not a high stress area, as shown below.



High Stress Areas Shaded

If silver terminations are used, however, full coverage of the silver by the solder is important for avoiding silver migration under load humidity conditions. The metal barriers of the SolderGuard II terminations effectively prevent migration of the internal silver.

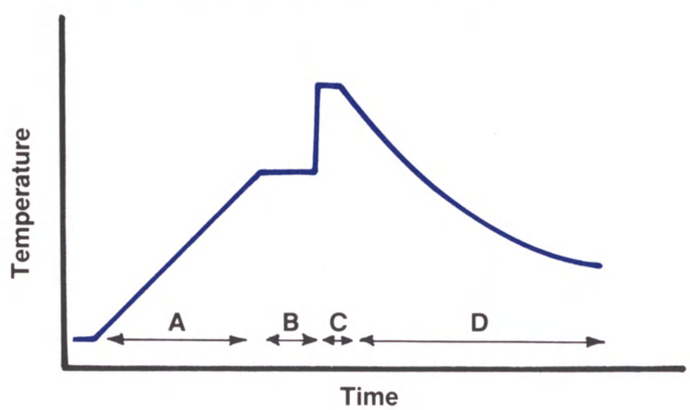
RECOMMENDATIONS FOR SURFACE MOUNTING (Cont'd)

3. Solder Heat and Thermal Shock

Ceramic dielectrics, like other ceramic materials, have high elastic modulii and low thermal conductivities. As a result, large stresses are created by sharp temperature gradients which occur when the temperature of the surface of the chip is suddenly changed. Under severe conditions, cracks can be induced in the dielectric. The following will aid in avoiding thermal shock damage:

A. Solder iron attachment is not recommended. If it must be used, both the substrate and the chip should be preheated and the iron temperature controlled, so that the difference between it and the preheated chip does not exceed 200°C (150° C for 1005 and smaller chips). The iron should *never* directly touch the bare ceramic surface nor the end metallization of the chip. Avoid applying force to the cantilevered end of a chip with one end soldered in place.

B. Preheating is also important with wave soldering and dipping methods. The temperature-time profile of the chip surface can be considered being made up of 4 periods as shown.



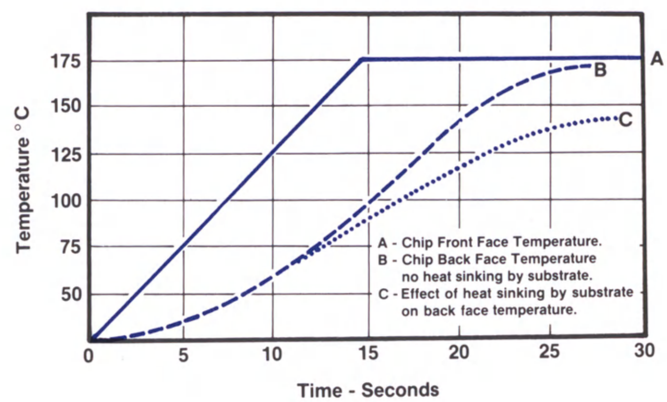
The following guidelines are usually applicable for each period:

Period A: Ramp to Preheat Temperature

To avoid large temperature gradients within the capacitor chip, the rate of temperature rise of the face of the chip toward the heat source should be less than $5/t^2$ in °C/sec where t is the chip thickness in mm, i.e., the ramp should be less than 1°C/sec for a 2.5 mm chip. In applying these criteria and those given below, consider the largest ceramic chip capacitor on the board or substrate.

Period B: Preheat Hold Time

A preheat temperature within 80°C of the solder temperature (100°C for C1005 and smaller chips) is recommended. The smaller the temperature differential, the less likelihood of thermal shock damage to the component. The preheat hold time is the time the surface of the chip is within 80°C of the solder temperature. This time is critical to allow the side of the chip toward the substrate to approach the maximum preheat temperature. The degree to which the preheat temperature is approached by the entire chip depends strongly on the temperature and heat sinking properties of the substrate. A steady state temperature condition is approached fairly rapidly by the chip if the substrate surface temperature does not change markedly. As a rule of thumb, the preheat hold time should be greater than $10t^2$ seconds where t is the chip thickness in mm, i.e., at least 10 seconds for a .75 mm thick chip and at least 100 seconds for a 2.5 mm thick chip. The temperature lag by the chip surface away from the heat source and the effect of heat sinking by the substrate are illustrated below.



Period C: Solder Wave or Dip

Typically, a 3 second time is adequate. The entire capacitor should be immersed in the solder.

Period D: Cool Down

Ambient, not forced air, conditions are recommended. Chips should cool at the same rate as that of the preheat. Forced cooling can cause thermal shock damage to the chip.

4. Soldering Materials and Conditions

A. Solder Wetting and Leach Resistance

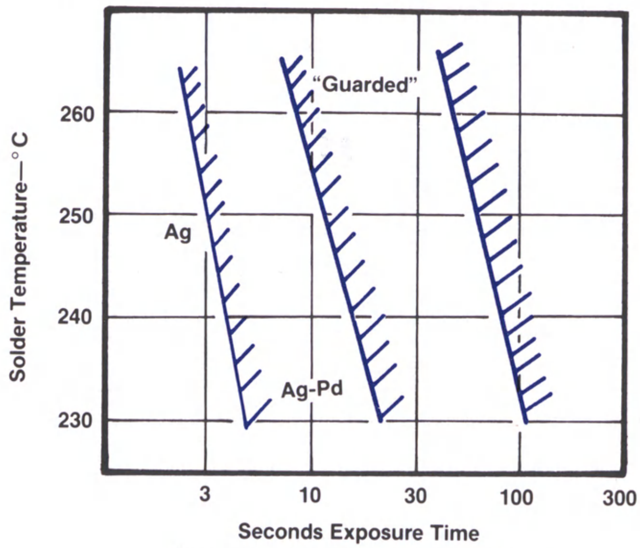
Kemet recommends the use of "guarded" terminations for two reasons.

(i) The outer surface layer itself dissolves into the liquid solder, assuring superior wetting by the lead-tin assembly solders.

(ii) The base metal barrier layer, nickel in Solder-Guard II, is readily wet by solders, but is much less readily dissolved by the solders than silver, or silver-palladium compositions.

RECOMMENDATIONS FOR SURFACE MOUNTING (Cont'd)

Comparative data on the leach resistance of various terminations is shown below.



Ceramic Chip Solder Attachment

The graph shows time-temperature limits for Ag, Ag-Pd and "guarded" terminations.

These data were generated with Sn62 solder, an agitated solder pot, and a failure criterion of 10% of termination surface dewetted. It provides a starting point for defining a soldering process.

Test results and actual on-the-line experience, however, are strongly influenced by the following factors:

Increasing leaching/dewetting
- high Sn-content solder
- active fluxes
- agitation of solder
- large solder reservoir

Decreasing leaching/dewetting
- low Sn-content solder
- silver or copper as additives or contaminants in the solder
- limited solder supply-e.g., use of solder pastes

B. Formation of Brittle Intermetallic Compounds

Gold, silver, copper, nickel, and many other elements, form brittle intermetallic compounds with tin. They are present whenever solder joints are made between metals and tin-containing solder*. The intermetallic can be minimized by avoiding the following:
- very high tin-content solders
- long dwells above the solder melting temperature without motion or "washing" action by the solder
- allowing the build up of metallic contaminants in the solder reservoir

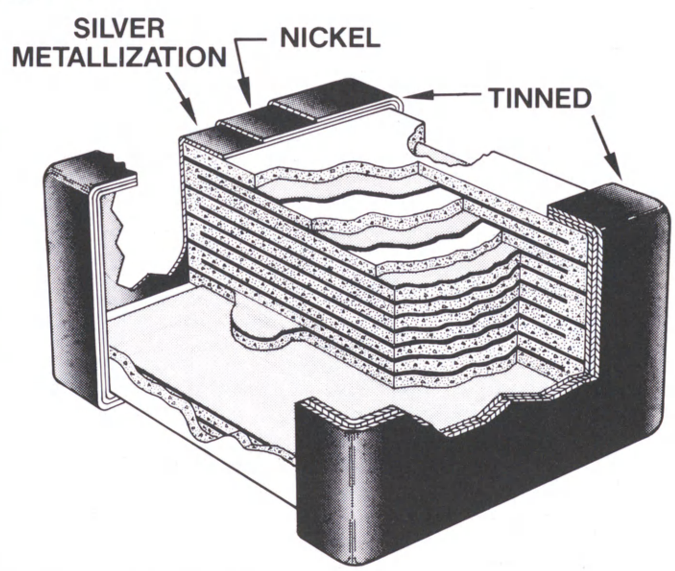
*The tin coating of the SolderGuard II termination is applied electrochemically and is very thin, eliminating concerns regarding intermetallic formation.

SOLDERGUARD II

The standard SolderGuard II end metallization consists of a dense and uniform barrier of nickel electroplated over a thick film layer of silver.

The nickel barrier prohibits the leaching of silver, and meets the requirements of EIA specification RS-198-C, Test Method B4.

A layer of 100% tin is then electroplated over the nickel. Tin is the superior metallization in terms of wettability, appearance, and shelf life.



NOTICE

Any capacitor misapplied may fail and thereby damage other circuit components. Please refer to application notes and recommendations in this catalog for a complete description of capacitor characteristics.

REELING INFORMATION
(For use in automated pick and place equipment)

KEMET offers Multilayer Ceramic Chip Capacitors packaged in aluminum carrier tape form in most chip sizes for automatic placement on printed circuit boards. They are available in nine sizes. (See table on next page.)

KEMET taped and reeled capacitors conform to the Electronic Industries Association specification RS-481 (Taping of Surface Mount Components for Automatic Placement).

See table below for maximum capacitance in the three dielectrics and voltages available.

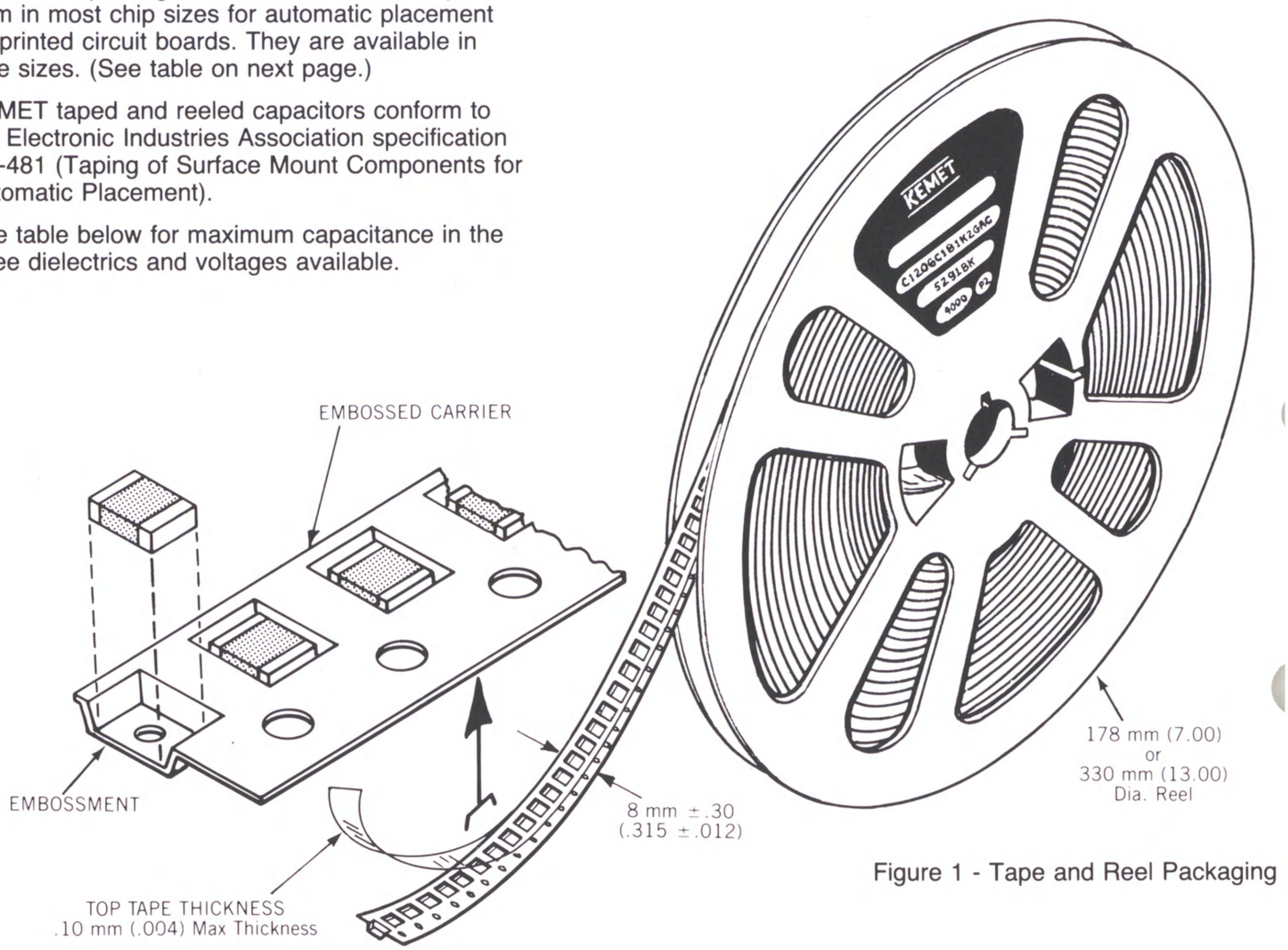
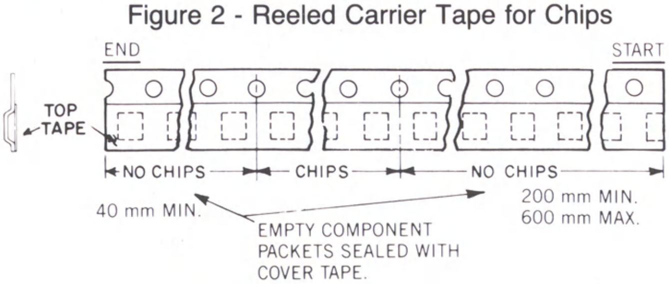


Figure 1 - Tape and Reel Packaging

Shown in Figure 1, KEMET Chip Capacitors are wound on a standard 178.0 mm (7.00″) or 330.0 mm (13.00″) diameter reel. Seven-inch diameter reels contain up to 2500 chips and for 13.0″ diameter reels, up to 12,500 chips.

Figure 2 shows carrier leader and ending quantities of KEMET Multilayer Ceramic Chips on reels and Figure 3, carrier dimensions.

Figure 2 - Reeled Carrier Tape for Chips



If your company is already using chip component placement machines that utilize reeled components, or if you are considering the purchase of such equipment, KEMET reeled capacitors can be easily fed into your machine.

Maximum Capacitance Values Available in KEMET Reel Packaging per EIA Spec. RS-481

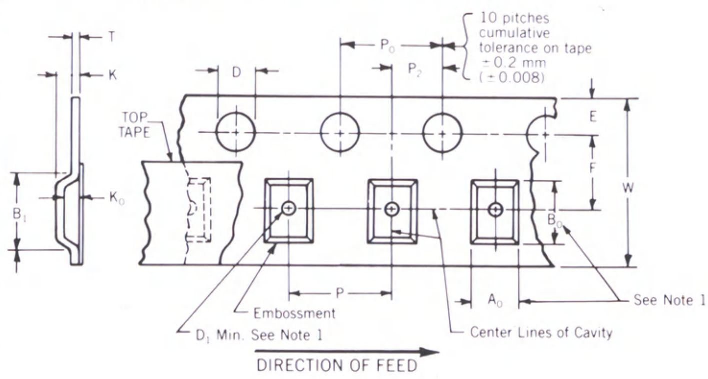
Dielectric	Voltage	0805	1206	1210
COG	200	270 pF	1,200 pF	2,200 pF
	100	470 pF	2,200 pF	4,700 pF
X7R	100	4,700 pF	22,000 pF	47,000 pF
	50	12,000 pF	100,000 pF	150,000 pF
Z5U	100	10,000 pF	39,000 pF	82,000 pF
	50	27,000 pF	150,000 pF	270,000 pF

REELING INFORMATION (Cont'd)

CHIP QUANTITIES PER REEL

CHIP SIZE	STANDARD QUANTITIES 178 mm DIA. (7 inches)	330 mm DIA. (13 inches)	Tape WIDTH (mm)	Pitch (mm)
C0805	2,500	10,000	8	4
C1005	2,500	10,000	8	4
C1206	2,500	10,000	8	4
C1210	2,500	10,000	8	4
C1805	2,500	10,000	12	4
C1808	2,500	10,000	12	4
C1812	1,100	4,000	12	8
C1825	1,100	4,000	12	8
C2225	1,100	4,000	12	8

Figure 3 - Tape Carrier Dimensions



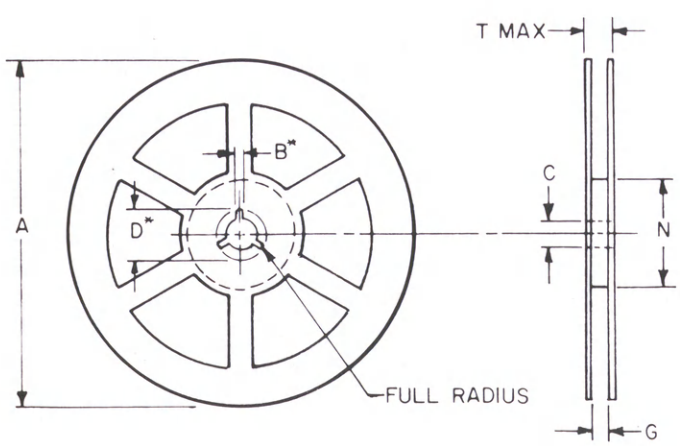
DIMENSIONS—MILLIMETERS & (INCHES)

SIZE	B_1	D	D_1	E	F	K
8 mm	4.2 max. (.165)	1.5 +0.1 −0.0	1.0 min. (.039)	1.75 ±.10 (.069 ±.004)	3.5 ±.05 (1.38 ±.002)	2.4 max. (.094)
12 mm	8.2 max. (.323)	(.059 +.004) −0.0	1.5 min. (.059)	1.75 ±.10 (.069 ±.004)	5.5 ±.05 (.217 ±.002)	4.5 max. (.177)
P	**P_0**	**P_2**	**T**	**W**	**A_0, B_0 K_0**	**SPROCKET**
4.0 ±0.1 (1.57 ±.004)	4.0 ± 0.1 (.156 ± .004)	2.0 ±.05 (.079 ±.002)	.4 max. (.016)	8.0 ±.30 (.315 ±.012)	See Note 1	Single
4.0 ±.1 (1.57 ±.004) or 8.0 ±.01 (3.15 ±.004)	4.0 ± 0.1 (.156 ± .004)	2.0 ±.05 (.079 ±.002)	.4 max. (.016)	12 ±.30 (.472 ±.012)	See Note 1	Single

Metric Dimensions will govern.
English measurements rounded and for reference only.

Note: 1 A_0, B_0 & K_0 are determined by maximum specific length, width, and thickness of components plus 0.4 ± 0.2 (0.016 ± 0.008), plus the additional requirements that components not be allowed to rotate more than 20° within the cavity clearance or whichever condition occurs first.

Figure 4 - Tape Reel Dimensions



*DRIVE SPOKES OPTIONAL.
IF USED, ASTERISKED DIMENSIONS APPLY.

DIMENSION	SYMBOL	NOMINAL mm (Inch)	TOLERANCE mm (Inch)
REEL DIAMETER	A	A. 178.0 (7.00) or B. 330.0 (13.00)	±2.0 (±0.079) ±2.0 (±0.079)
DRIVE SPOKE WIDTH	B*	1.5 (.06)	MIN.
REEL CENTER HOLE DIAMETER	C	13.0 (0.512)	±0.5 (±0.020)
DRIVE SPROCKET DIAMETER	D*	20.2 (0.795)	MIN.
REEL HUB DIAMETER	N	50.0 (1.969)	MIN.
REEL INSIDE WIDTH	G	8.4 (0.33)	+1.5, −0 (+0.059)
REEL OUTSIDE WIDTH	T	14.4 (0.56)	MAX.

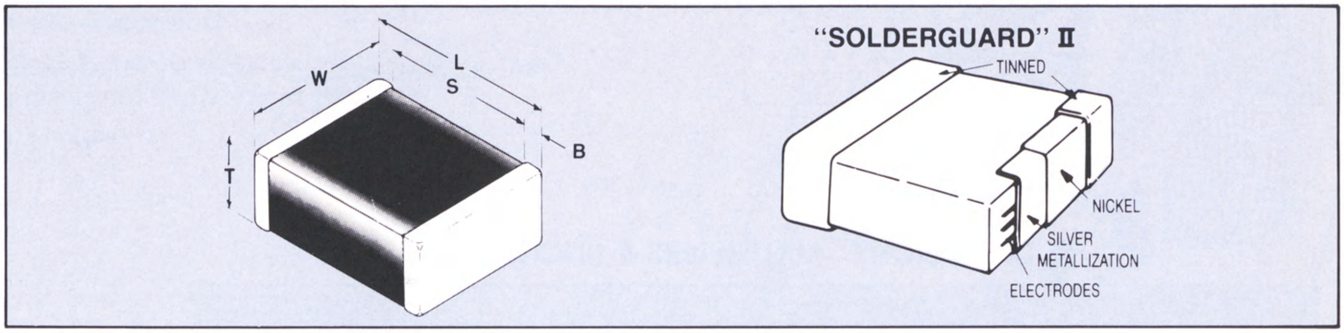
METRIC DIMENSIONS WILL GOVERN.
ENGLISH MEASUREMENTS ROUNDED AND FOR REFERENCE ONLY.

CERAMIC CHIP CAPACITORS

SURFACE MOUNT

Standard SolderGuard II chips feature a unique barrier layer of nickel in the end metallization that prevents silver leaching or scavenging, and subsequent open circuits during assembly. The "SolderGuard" chips will withstand solder reflow temperatures with little or no degradation of electrical continuity or performance, KEMET chips are available in C0G, X7R and Z5U temperature characteristics in 50, 100 and 200 volt ratings. All chip capacitors are available in tape and reel packaging for automatic pick-and-place machines. For further information, see pages 10 and 11.

CAPACITOR OUTLINE DRAWINGS



DIMENSIONS—MILLIMETERS AND (INCHES)

SIZE CODE	L LENGTH	W WIDTH	T THICKNESS MAX.	B BANDWIDTH	S MIN. SEPARATION	MOUNTING TECHNIQUE
0805	2.0 (.078) ± 0.2 (.008)	1.25 (.049) ± 0.2 (.008)	1.4 (.055)	0.43 (.017) ± .25 (.010)	0.61 (.024)	Solder wave or Solder reflow
1005	2.5 (.098) ± 0.2 (.008)	1.25 (.049) ± 0.2 (.008)	1.5 (.059)	0.64 (.025) ± .38 (.015)	0.61 (.024)	
1206	3.2 (.126) ± 0.2 (.008)	1.6 (.063) ± 0.2 (.008)	1.5 (.059)	0.64 (.025) ± .38 (.015)	1.0 (.040)	
1210	3.2 (.126) ± 0.2 (.008)	2.5 (.098) ± 0.2 (.008)	1.7 (.067)	0.64 (.025) ± .38 (.015)	1.0 (.040)	
1805	4.5 (.177) ± 0.3 (.012)	1.25 (.049) ± 0.3 (.012)	1.7 (.067)	0.64 (.025) ± .38 (.015)	1.0 (.040)	Solder Reflow
1808	4.5 (.177) ± 0.3 (.012)	2.0 (.079) ± 0.3 (.012)	1.7 (.067)	0.64 (.025) ± .38 (.015)	1.0 (.040)	
1812	4.5 (.177) ± 0.3 (.012)	3.2 (.126) ± 0.3 (.012)	1.7 (.067)	0.64 (.025) ± .38 (.015)	1.0 (.040)	
1825	4.5 (.177) ± 0.3 (.012)	6.4 (.252) ± 0.3 (.012)	1.7 (.067)	0.64 (.025) ± .38 (.015)	1.0 (.040)	
2225	5.6 (.220) ± 0.4 (.016)	6.3 (.248) ± 0.4 (.016)	2.0 (.079)	0.64 (.025) ± .38 (.015)	1.0 (.040)	

Note: Dimensions above apply to Solderguard II Chips. When Solderguard I chips are ordered the length, width, thickness and bandwidth must be increased by 0.015" to allow solderdip buildup.

CAPACITOR ORDERING INFORMATION

C 0805 C 103 K 5 R A C

CERAMIC

SIZE CODE
See table above

SPECIFICATION
C — Standard

CAPACITANCE CODE
Expressed in Picofarads (pF)
First two digit-significant figures.
Third digit-number of zeros. (Use 9 for 1.0 thru 9.9 pF.
Example: 2.2pF — 229).

CAPACITANCE TOLERANCE

Special Order Tolerances
D—±0.5 pF, F—±1%, G— ± 2%
H—±3%

Standard Order Tolerances
J—±5% P—(GMV)
K—±10% Z—+80% – 20%
M—±20%

VOLTAGE
1 — 100V, 5 — 50V
2 — 200V

TEMPERATURE CHARACTERISTIC
Designated by Capacitance Change Over Temperature Range
G — C0G (NPO) (±30 PPM/°C)
R — X7R (±15%)
U — Z5U (+22%, -56%)

FAILURE RATE LEVEL (%/1,000 HOURS)
A — Standard for "C" specification

END METALLIZATION
C—SolderGuard II

Marking per EIA standard is optional

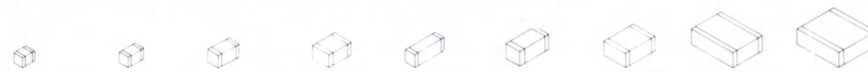
 KEMET Electronics Corporation, P.O. Box 5928, Greenville, S.C. 29606, (803) 963-6300

CERAMIC CHIP/STANDARD (C0G)/(NPO)

FEATURING SOLDERGUARD II

KEMET®

CAPACITANCE RANGES—C0G DIELECTRIC



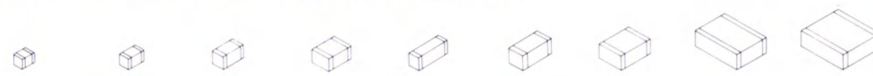
CAP. pF	KEMET PART NUMBER	C0805*		C1005		C1206*		C1210*		C1805		C1808		C1812*		C1825*		C2225	
		50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V
1.0	C(_ _ 1 _ _)C109 (2)(3) GA (4)	109	109	109	109	109	109												
1.2	C(_ _ 1 _ _)C129 (2)(3) GA (4)	129	129	129	129	129	129												
1.5	C(_ _ 1 _ _)C159 (2)(3) GA (4)	159	159	159	159	159	159												
1.8	C(_ _ 1 _ _)C189 (2)(3) GA (4)	189	189	189	189	189	189												
2.2	C(_ _ 1 _ _)C229 (2)(3) GA (4)	229	229	229	229	229	229												
2.7	C(_ _ 1 _ _)C279 (2)(3) GA (4)	279	279	279	279	279	279												
3.3	C(_ _ 1 _ _)C339 (2)(3) GA (4)	339	339	339	339	339	339												
3.9	C(_ _ 1 _ _)C399 (2)(3) GA (4)	399	399	399	399	399	399												
4.7	C(_ _ 1 _ _)C479 (2)(3) GA (4)	479	479	479	479	479	479												
5.6	C(_ _ 1 _ _)C569 (2)(3) GA (4)	569	569	569	569	569	569												
6.8	C(_ _ 1 _ _)C689 (2)(3) GA (4)	689	689	689	689	689	689												
8.2	C(_ _ 1 _ _)C829 (2)(3) GA (4)	829	829	829	829	829	829												
10.0	C(_ _ 1 _ _)C100 (2)(3) GA (4)	100	100	100	100	100	100												
12.0	C(_ _ 1 _ _)C120 (2)(3) GA (4)	120	120	120	120	120	120												
15.0	C(_ _ 1 _ _)C150 (2)(3) GA (4)	150	150	150	150	150	150												
18.0	C(_ _ 1 _ _)C180 (2)(3) GA (4)	180	180	180	180	180	180												
22.0	C(_ _ 1 _ _)C220 (2)(3) GA (4)	220	220	220	220	220	220												
27.0	C(_ _ 1 _ _)C270 (2)(3) GA (4)	270	270	270	270	270	270												
33.0	C(_ _ 1 _ _)C330 (2)(3) GA (4)	330	330	330	330	330	330												
39.0	C(_ _ 1 _ _)C390 (2)(3) GA (4)	390	390	390	390	390	390												
47.0	C(_ _ 1 _ _)C470 (2)(3) GA (4)	470	470	470	470	470	470												
56.0	C(_ _ 1 _ _)C560 (2)(3) GA (4)	560	560	560	560	560	560												
68.0	C(_ _ 1 _ _)C680 (2)(3) GA (4)	680	680	680	680	680	680												
82.0	C(_ _ 1 _ _)C820 (2)(3) GA (4)	820	820	820	820	820	820												
100.0	C(_ _ 1 _ _)C101 (2)(3) GA (4)	101	101	101	101	101	101												
120.0	C(_ _ 1 _ _)C121 (2)(3) GA (4)	121	121	121	121	121	121												
150.0	C(_ _ 1 _ _)C151 (2)(3) GA (4)	151	151	151	151	151	151												
180.0	C(_ _ 1 _ _)C181 (2)(3) GA (4)	181	181	181	181	181	181												
220.0	C(_ _ 1 _ _)C221 (2)(3) GA (4)	221	221	221	221	221	221												
270.0	C(_ _ 1 _ _)C271 (2)(3) GA (4)	271	271	271	271	271	271												
330.0	C(_ _ 1 _ _)C331 (2)(3) GA (4)	331	331	331	331	331	331												
390.0	C(_ _ 1 _ _)C391 (2)(3) GA (4)	391		391	391	391	391												
470.0	C(_ _ 1 _ _)C471 (2)(3) GA (4)	471		471	471	471	471			471	471	471	471	471	471				
560.0	C(_ _ 1 _ _)C561 (2)(3) GA (4)	561		561	561	561	561			561	561	561	561	561	561				
680.0	C(_ _ 1 _ _)C681 (2)(3) GA (4)			681	681	681	681			681	681	681	681	681	681				
820.0	C(_ _ 1 _ _)C821 (2)(3) GA (4)			821		821	821			821	821	821	821	821	821				
1000.0	C(_ _ 1 _ _)C102 (2)(3) GA (4)			102		102	102	102	102	102	102	102	102	102	102				
1200.0	C(_ _ 1 _ _)C122 (2)(3) GA (4)					122	122	122	122	122	122	122	122	122	122				
1500.0	C(_ _ 1 _ _)C152 (2)(3) GA (4)					152	152	152	152	152	152	152	152	152	152				
1800.0	C(_ _ 1 _ _)C182 (2)(3) GA (4)					182		182	182	182		182	182	182	182				
2200.0	C(_ _ 1 _ _)C222 (2)(3) GA (4)					222		222	222	222		222	222	222	222				
2700.0	C(_ _ 1 _ _)C272 (2)(3) GA (4)							272	272	272		272	272	272	272				
3300.0	C(_ _ 1 _ _)C332 (2)(3) GA (4)							332				332	332	332	332				
3900.0	C(_ _ 1 _ _)C392 (2)(3) GA (4)							392				392	392	392	392				
4700.0	C(_ _ 1 _ _)C472 (2)(3) GA (4)							472				472		472	472				
5600.0	C(_ _ 1 _ _)C562 (2)(3) GA (4)													562	562	562	562		
6800.0	C(_ _ 1 _ _)C682 (2)(3) GA (4)													682	682	682	682	682	682
8200.0	C(_ _ 1 _ _)C822 (2)(3) GA (4)													822		822	822	822	822
10,000.0	C(_ _ 1 _ _)C103 (2)(3) GA (4)													103		103	103	103	103
12,000.0	C(_ _ 1 _ _)C123 (2)(3) GA (4)															123	123	123	123
15,000.0	C(_ _ 1 _ _)C153 (2)(3) GA (4)															153	153	153	153
18,000.0	C(_ _ 1 _ _)C183 (2)(3) GA (4)															183	183	183	183
22,000.0	C(_ _ 1 _ _)C223 (2)(3) GA (4)															223		223	
27,000.0	C(_ _ 1 _ _)C273 (2)(3) GA (4)																	273	

(1) To complete part number, insert four digit number for KEMET style desired: 0805, 1005, 1206, 1210, 1805, 1808, 1812, 1825 or 2225.
(2) To complete part number, insert appropriate letter for capacitance tolerance desired: C— ±0.25 pF; D— ±0.5 pF are only for values less than 10 pF. F— ±1%; G— ±2%; H— ±3%; J— ±5% are only for values of 100 pF or greater; K ±10%; and M— ±20% for values 10 pF and higher.
(3) To complete part number, insert appropriate number for voltage desired: "2"—200 volts; "1"—100 volts; "5"—50 volts. 200 volts available upon request for selected ratings.
(4) To complete part number, insert appropriate letter for end metallization desired: C—SolderGuard II or T—Silver.

*EIA preferred chip sizes.

	0805	1005	1206	1210	1805	1808	1812	1825	2225
NOTE: MAXIMUM CAPACITANCE AVAILABLE AT 200 VOLTS, C0G DIELECTRIC (SHOWN IN CAP CODE)	221	471	102	222	102	272	682	103	153
MINIMUM CAPACITANCE AVAILABLE AT 200V	109	109	109	100	221	331	471	392	472

CAPACITANCE RANGES—X7R DIELECTRIC



CAP. pF	KEMET PART NUMBER	C0805*		C1005		C1206*		C1210*		C1805		C1808		C1812*		C1825*		C2225	
		50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V
470.0	C(_ _1_ _)C471 (2)(3) RA (4)	471	471																
560.0	C(_ _1_ _)C561 (2)(3) RA (4)	561	561																
680.0	C(_ _1_ _)C681 (2)(3) RA (4)	681	681	681	681														
820.0	C(_ _1_ _)C821 (2)(3) RA (4)	821	821	821	821														
1000.0	C(_ _1_ _)C102 (2)(3) RA (4)	102	102	102	102	102	102												
1200.0	C(_ _1_ _)C122 (2)(3) RA (4)	122	122	122	122	122	122												
1500.0	C(_ _1_ _)C152 (2)(3) RA (4)	152	152	152	152	152	152												
1800.0	C(_ _1_ _)C182 (2)(3) RA (4)	182	182	182	182	182	182												
2200.0	C(_ _1_ _)C222 (2)(3) RA (4)	222	222	222	222	222	222												
2700.0	C(_ _1_ _)C272 (2)(3) RA (4)	272	272	272	272	272	272												
3300.0	C(_ _1_ _)C332 (2)(3) RA (4)	332	332	332	332	332	332			332	332								
3900.0	C(_ _1_ _)C392 (2)(3) RA (4)	392	392	392	392	392	392			392	392								
4700.0	C(_ _1_ _)C472 (2)(3) RA (4)	472	472	472	472	472	472			472	472								
5600.0	C(_ _1_ _)C562 (2)(3) RA (4)	562	562	562	562	562	562			562	562	562	562						
6800.0	C(_ _1_ _)C682 (2)(3) RA (4)	682		682	682	682	682			682	682	682	682						
8200.0	C(_ _1_ _)C822 (2)(3) RA (4)	822		822	822	822	822			822	822	822	822						
10,000.0	C(_ _1_ _)C103 (2)(3) RA (4)	103		103	103	103	103	103	103	103	103	103	103	103	103				
12,000.0	C(_ _1_ _)C123 (2)(3) RA (4)	123		123	123	123	123	123	123	123	123	123	123	123	123				
15,000.0	C(_ _1_ _)C153 (2)(3) RA (4)	153		153	153	153	153	153	153	153	153	153	153	153	153				
18,000.0	C(_ _1_ _)C183 (2)(3) RA (4)	183		183		183	183	183	183	183	183	183	183	183	183				
22,000.0	C(_ _1_ _)C223 (2)(3) RA (4)	223		223		223	223	223	223	223	223	223	223	223	223				
27,000.0	C(_ _1_ _)C273 (2)(3) RA (4)			273		273	273	273	273	273	273	273	273	273	273				
33,000.0	C(_ _1_ _)C333 (2)(3) RA (4)			333		333		333	333	333		333	333	333	333				
39,000.0	C(_ _1_ _)C393 (2)(3) RA (4)			393		393		393	393	393		393	393	393	393				
47,000.0	C(_ _1_ _)C473 (2)(3) RA (4)					473		473	473	473		473	473	473	473				
56,000.0	C(_ _1_ _)C563 (2)(3) RA (4)					563		563	563	563		563	563	563	563				
68,000.0	C(_ _1_ _)C683 (2)(3) RA (4)					683		683		683		683		683	683				
82,000.0	C(_ _1_ _)C823 (2)(3) RA (4)					823		823		823		823		823	823				
100,000.0	C(_ _1_ _)C104 (2)(3) RA (4)					104		104		104		104		104	104				
120,000.0	C(_ _1_ _)C124 (2)(3) RA (4)							124				124		124		124	124		
150,000.0	C(_ _1_ _)C154 (2)(3) RA (4)							154				154		154		154	154		
180,000.0	C(_ _1_ _)C184 (2)(3) RA (4)											184		184		184	184		
220,000.0	C(_ _1_ _)C224 (2)(3) RA (4)													224		224	224		
270,000.0	C(_ _1_ _)C274 (2)(3) RA (4)													274		274		274	274
330,000.0	C(_ _1_ _)C334 (2)(3) RA (4)													334		334		334	334
390,000.0	C(_ _1_ _)C394 (2)(3) RA (4)															394		394	394
470,000.0	C(_ _1_ _)C474 (2)(3) RA (4)															474		474	
560,000.0	C(_ _1_ _)C564 (2)(3) RA (4)															564		564	
680,000.0	C(_ _1_ _)C684 (2)(3) RA (4)															684		684	
820,000.0	C(_ _1_ _)C824 (2)(3) RA (4)																	824	
1,000,000.0	C(_ _1_ _)C105 (2)(3) RA (4)																	105	

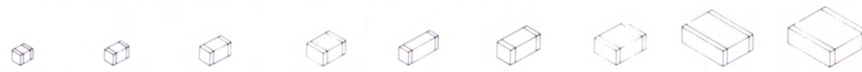
(1) To complete part number, insert four digit number for KEMET style desired: 0805, 1005, 1206, 1210, 1805, 1808, 1812, 1825 or 2225.
(2) To complete part number, insert appropriate letter for capacitance tolerance desired: K— ± 10%; M— ± 20%; P—(GMV); X—Other.
(3) To complete part number, insert appropriate number for voltage desired: "2"—200 volts; "1"—100 volts; "5"—50 volts. 200 volts available upon request for selected ratings.
(4) To complete part number, insert appropriate letter for end metallization desired: C—SolderGuard II or T—Silver.

*EIA preferred chip sizes.

NOTE: MAXIMUM CAPACITANCE AVAILABLE AT 200 VOLTS, X7R DIELECTRIC (SHOWN IN CAP CODE)

	0805	1005	1206	1210	1805	1808	1812	1825	2225
MAXIMUM CAPACITANCE AVAILABLE AT 200 VOLTS	102	222	562	123	562	183	273	563	823
MINIMUM CAPACITANCE AVAILABLE AT 200V	221	331	102	222	272	472	682	223	223

CAPACITANCE RANGES—Z5U DIELECTRIC



CAP. pF	KEMET PART NUMBER	C0805*		C1005		C1206*		C1210*		C1805		C1808		C1812*		C1825*		C2225	
		50V	100v	50V	100v	50V	100v	50V	100v	50V	100v	50V	100v	50V	100v	50V	100v	50V	100v
6800.0	C(_ _1_ _)C682 (2)(3) UA (4)	682	682																
8200.0	C(_ _1_ _)C822 (2)(3) UA (4)	822	822																
10,000.0	C(_ _1_ _)C103 (2)(3) UA (4)	103	103																
12,000.0	C(_ _1_ _)C123 (2)(3) UA (4)	123																	
15,000.0	C(_ _1_ _)C153 (2)(3) UA (4)	153																	
18,000.0	C(_ _1_ _)C183 (2)(3) UA (4)	183		183	183														
22,000.0	C(_ _1_ _)C223 (2)(3) UA (4)	223		223	223														
27,000.0	C(_ _1_ _)C273 (2)(3) UA (4)	273		273															
33,000.0	C(_ _1_ _)C333 (2)(3) UA (4)	333		333		333	333			333	333								
39,000.0	C(_ _1_ _)C393 (2)(3) UA (4)			393		393	393			393	393								
47,000.0	C(_ _1_ _)C473 (2)(3) UA (4)			473		473		473	473	473									
56,000.0	C(_ _1_ _)C563 (2)(3) UA (4)			563		563		563	563	563									
68,000.0	C(_ _1_ _)C683 (2)(3) UA (4)			683		683		683	683	683		683	683						
82,000.0	C(_ _1_ _)C823 (2)(3) UA (4)			823		823		823	823	823		823	823	823	823				
100,000.0	C(_ _1_ _)C104 (2)(3) UA (4)					104		104		104		104		104	104				
120,000.0	C(_ _1_ _)C124 (2)(3) UA (4)					124		124		124		124		124	124				
150,000.0	C(_ _1_ _)C154 (2)(3) UA (4)					154		154		154		154		154	154				
180,000.0	C(_ _1_ _)C184 (2)(3) UA (4)							184				184		184		184	184		
220,000.0	C(_ _1_ _)C224 (2)(3) UA (4)							224				224		224		224	224		
270,000.0	C(_ _1_ _)C274 (2)(3) UA (4)							274				274		274		274	274		
330,000.0	C(_ _1_ _)C334 (2)(3) UA (4)											334		334		334	334	334	334
390,000.0	C(_ _1_ _)C394 (2)(3) UA (4)													394		394	394	394	394
470,000.0	C(_ _1_ _)C474 (2)(3) UA (4)													474		474		474	474
560,000.0	C(_ _1_ _)C564 (2)(3) UA (4)													564		564		564	
680,000.0	C(_ _1_ _)C684 (2)(3) UA (4)													684		684		684	
820,000.0	C(_ _1_ _)C824 (2)(3) UA (4)															824		824	
1,000,000.0	C(_ _1_ _)C105 (2)(3) UA (4)															105		105	
1,200,000.0	C(_ _1_ _)C125 (2)(3) UA (4)															125		125	
1,500,000.0	C(_ _1_ _)C155 (2)(3) UA (4)															155		155	
1,800.000.0	C(_ _1_ _)C185 (2)(3) UA (4)																	185	
2,200,000.0	C(_ _1_ _)C225 (2)(3) UA (4)																	225	

(1) To complete part number, insert four digit number for KEMET style desired: 0805, 1005, 1206, 1210, 1805, 1808, 1812, 1825 or 2225.
(2) To complete part number, insert appropriate letter for capacitance tolerance desired: M—±20%; P—(GMV); Z—+80%, −20%.
(3) To complete part number, insert appropriate number for voltage desired: "1"—100 volts; "5"—50 volts.
(4) To complete part number, insert appropriate letter for end metallization desired: C—SolderGuard II or T—Silver.

*EIA preferred chip sizes.

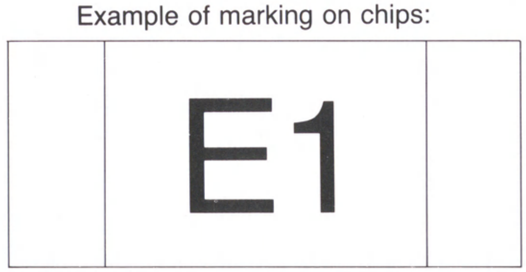
SURFACE MOUNT
OPTIONAL TWO DIGIT MARKING PER EIA-J CODE

Chips are normally supplied unmarked. However, as an option, they may be marked with an alpha character and a numeral to indicate capacitance value. The alpha character and numeral shall be determined as follows:

Alpha character: Based on 1st and 2nd significant figures of capacitance.
Numeral: Log of the decimal multiplier of capacitance.
EXAMPLE: A0 = 1.0 pF, N4 = 33,000 pF

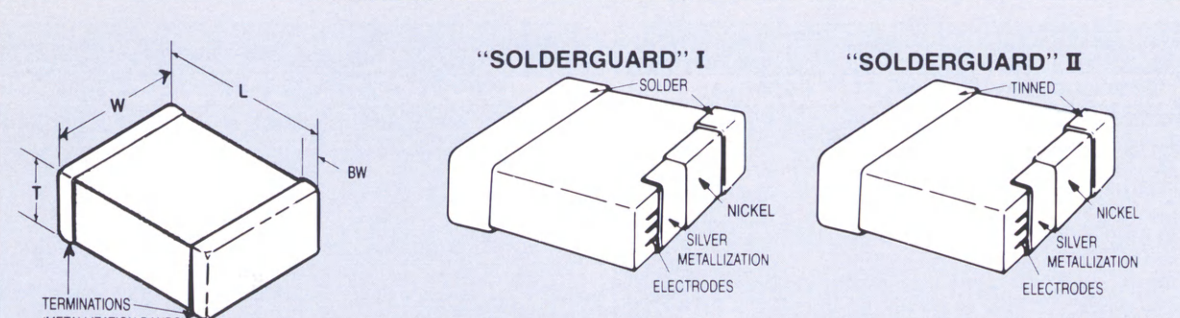
	Capacitance (pF) For Various Numeral Identifiers					
Alpha Character \ Numeral	0	1	2	3	4	5
A	1.0	10	100	1000	10,000	100,000
B	1.1	11	110	1100	11,000	110,000
C	1.2	12	120	1200	12,000	120,000
D	1.3	13	130	1300	13,000	130,000
E	1.5	15	150	1500	15,000	150,000
F	1.6	16	160	1600	16,000	160,000
G	1.8	18	180	1800	18,000	180,000
H	2.0	20	200	2000	20,000	200,000
J	2.2	22	220	2200	22,000	220,000
K	2.4	24	240	2400	24,000	240,000
L	2.7	27	270	2700	27,000	270,000
M	3.0	30	300	3000	30,000	300,000
N	3.3	33	330	3300	33,000	330,000
P	3.6	36	360	3600	36,000	360,000
Q	3.9	39	390	3900	39,000	390,000
R	4.3	43	430	4300	43,000	430,000
S	4.7	47	470	4700	47,000	470,000
T	5.1	51	510	5100	51,000	510,000
U	5.6	56	560	5600	56,000	560,000
V	6.2	62	620	6200	62,000	620,000
W	6.8	68	680	6800	68,000	680,000
X	7.5	75	750	7500	75,000	750,000
Y	8.2	82	820	8200	82,000	820,000
Z	9.1	91	910	9100	91,000	910,000
a	2.5					
b	3.5					
d	4.0					
e	4.5					
f	5.0					
m	6.0					
n	7.0					
t	8.0					
y	9.0					
	X1.0	X10	X100	X1000	X10,000	X100,000

Example of marking on chips:



(Orientation of marking is at manufacturer's option.)

CAPACITOR OUTLINE DRAWINGS



MILITARY DESIGNATION "S" OR "U"
KEMET DESIGNATION "H"

MILITARY DESIGNATION "W" or "Y"
KEMET DESIGNATION "C"

DIMENSIONS—MILLIMETERS & (INCHES)

STYLE	KEMET SIZE CODE	L	W	T MIN.	T MAX.	BW
CDR01	C0805	2.03 ±.38 (.080 ±.015)	1.27 ±.38 (.050 ±.015)	.51 (.020)	1.40 (.055)	.51 ±0.25 (.020 ±.010)
CDR02	C1805	4.57 ±.38 (.180 ±.015)	1.27 ±.38 (.050 ±.015)	.51 (.020)	1.40 (.055)	.51 ±0.25 (.020 ±.010)
CDR03	C1808	4.57 ±.38 (.180 ±.015)	2.03 ±.38 (.080 ±.015)	.51 (.020)	2.03 (.080)	.51 ±0.25 (.020 ±.010)
CDR04	C1812	4.57 ±.38 (.180 ±.015)	3.18 ±.38 (.125 ±.015)	.51 (.020)	2.03 (.080)	.51 ±0.25 (.020 ±.010)
CDR05	C1825	$4.57^{+.51}_{-.38}$ ($1.80^{+.020}_{-.015}$)	$6.35^{+.51}_{-.38}$ ($.250^{+.020}_{-.015}$)	.51 (.020)	2.03 (.080)	.51 ±0.25 (.020 ±.010)
CDR06	C2225	5.72 ±.51 (.225 ±.020)	6.35 ±.51 (.250 ±.020)	.51 (.020)	2.03 (.080)	.51 ±0.25 (.020 ±.010)
CDR31	C0805	2.00 ±.20 (.078 ±.008)	1.25 ±.20 (.049 ±.008)	.50 ±.20 (.020 ±.008)	1.30 ±.20 (.051 ±.008)	.50 ±0.20 (.020 ±.008)
CDR32	C1206	3.20 ±.20 (.125 ±.008)	1.60 ±.20 (.062 ±.008)	.50 ±.20 (.020 ±.008)	1.30 ±.20 (.051 ±.008)	.50 ±0.20 (.020 ±.008)
CDR33	C1210	3.20 ±.25 (.125 ±.010)	2.50 ±.25 (.098 ±.010)	.50 ±.25 (.020 ±.010)	1.50 ±.25 (.059 ±.010)	.50 ±0.20 (.020 ±.008)
CDR34	C1812	4.50 ±.25 (.176 ±.010)	3.20 ±.25 (.125 ±.010)	.50 ±.25 (.020 ±.010)	1.50 ±.25 (.059 ±.010)	.50 ±0.20 (.020 ±.008)
CDR35	C1825	4.50 ±.30 (.176 ±.012)	6.40 ±.30 (.250 ±.012)	.50 ±.30 (.020 ±.012)	1.50 ±.30 (.059 ±.012)	.50 ±0.20 (.020 ±.008)

Note: For Solderguard I (MIL-C55681 "S" or "U" Endmets), the length, width and thickness nominals (including bandwidth) cited above are allowed to increase by the following amounts:

	Length	Width/Thickness
CDR31-32	0.5 mm	0.3 mm
CDR33-35	0.6 mm	0.3 mm

MIL-C-55681 PART NUMBER ORDERING INFORMATION

CDR01 B P 101 B K S M

STYLE & SIZE CODE (CDR01)
STYLE
C — Ceramic
D — Dielectric, Fixed Chip
R — Established Reliability

RATED TEMPERATURE (B)
−55°C to +125°C

DIELECTRICS (P)
P — 0 ±30 ppm/°C—with or without voltage
X — ±15%—without voltage
+15%,—25% with voltage

CAPACITANCE (101)
Expressed in picofarads (pF).
First 2 digits represent significant figures and the last digit specifies the number of zeros to follow.
Example: 103 — 10,000 picofarads. When nominal value is less than 10 pF, the letter "R" is used to indicate the decimal point.
Example: 1R0 — 1.0 pF; R75 — 0.75; 0R5 — 0.5 pF.

RATED VOLTAGE (B)
A — 50; B — 100

CAPACITANCE TOLERANCE (K)

B	C	D	F	J	K	M
±.1 pF	±.25 pF	±.5 pF	±1%	±5%	±10%	±20%

TERMINATION FINISH (S)
S — Solder Coated, Final (SolderGuard I)
U — Base Metalization—Barrier Metal—Solder Coated (SolderGuard I)
W — Base Metalization—Barrier Metal—Tinned (Tin or Tin/Lead Alloy) (SolderGuard II)
Y — Base Metalization Barrier Metal—100% tin coated (SolderGuard II)

FAILURE RATE LEVEL (%/1000 hrs.) (M)
M — 1.0　R — 0.01
P — 0.1　S — 0.001

KEMET/MIL-C-55681 PART NUMBER EQUIVALENTS

C 0805 P 101 K 1 G M C

CERAMIC (C)

SIZE CODE (0805)
See Table Above

SPECIFICATION (P)
P-MIL-C-55681 = CDR01-CDR06
N-MIL-C-55681 = CDR31-CDR35

CAPACITANCE CODE (101)
Expressed in Picofarads (pF)
First two digits represent significant figures.
Third digit specifies number of zeros. (Use 9 for 1.0 thru 9.9 pF. Example: 2.2 pF −229)

CAPACITANCE TOLERANCE (K)

B	C	D	F	J	K	M
±.1 pF	±.25 pF	±.5 pF	±1%	±5%	±10%	±20%

VOLTAGE (1)
1 — 100V, 5 — 50V

VOLTAGE TEMPERATURE CHARACTERISTIC (G)
Designated by Capacitance
Change Over Temperature Range
G — BP (C0G/NPO) (±30 PPM/°C)
X — BX (±15% Without Voltage
+15% — 25% With Voltage)

FAILURE RATE (%/1,000 hrs.) (M)
M — 1.0　R — 0.01
P — 0.1　S — 0.001

END METALLIZATION (C)
C—SolderGuard II (Military equiv: W, Y)
H—SolderGuard I (Military equiv: S, U)

RATINGS & PART NUMBER REFERENCE

CHARAC-TERISTIC	CAP. pF	AVAIL. TOL.	KEMET CAPACITORS	MIL-C-55681 PART NUMBER
100 VOLT—C0805 SIZE (MILITARY CDR01)				
BP	10	J,K	C0805P100(3)1G(4)C	CDR01BP100B(3)W(4)
	12	J	C0805P120J1G(4)C	CDR01BP120BJW(4)
	15	J,K	C0805P150(3)1G(4)C	CDR01BP150B(3)W(4)
	18	J	C0805P180J1G(4)C	CDR01BP180BJW(4)
	22	J,K	C0805P220(3)1G(4)C	CDR01BP220B(3)W(4)
	27	J	C0805P270J1G(4)C	CDR01BP270BJW(4)
	33	J,K	C0805P330(3)1G(4)C	CDR01BP330B(3)W(4)
	39	J	C0805P390J1G(4)C	CDR01BP390BJW(4)
	47	J,K	C0805P470(3)1G(4)C	CDR01BP470B(3)W(4)
	56	J	C0805P560J1G(4)C	CDR01BP560BJW(4)
	68	J,K	C0805P680(3)1G(4)C	CDR01BP680B(3)W(4)
	82	J	C0805P820J1G(4)C	CDR01BP820BJW(4)
	100	J,K	C0805P101(3)1G(4)C	CDR01BP101B(3)W(4)
BP or BX	120	J,K	C0805P121(3)1(2)(4)C	CDR01B(1)121B(3)W(4)
	150	J,K	C0805P151(3)1(2)(4)C	CDR01B(1)151B(3)W(4)
	180	J,K	C0805P181(3)1(2)(4)C	CDR01B(1)181B(3)W(4)
BX	220	K,M	C0805P221(3)1X(4)C	CDR01BX221B(3)W(4)
	270	K	C0805P271K1X(4)C	CDR01BX271BKW(4)
	330	K,M	C0805P331(3)1X(4)C	CDR01BX331B(3)W(4)
	390	K	C0805P391K1X(4)C	CDR01BX391BKW(4)
	470	K,M	C0805P471(3)1X(4)C	CDR01BX471B(3)W(4)
	560	K	C0805P561K1X(4)C	CDR01BX561BKW(4)
	680	K,M	C0805P681(3)1X(4)C	CDR01BX681B(3)W(4)
	820	K	C0805P821K1X(4)C	CDR01BX821BKW(4)
	1,000	K,M	C0805P102(3)1X(4)C	CDR01BX102B(3)W(4)
	1,200	K	C0805P122K1X(4)C	CDR01BX122BKW(4)
	1,500	K,M	C0805P152(3)1X(4)C	CDR01BX152B(3)W(4)
	1,800	K	C0805P182K1X(4)C	CDR01BX182BKW(4)
	2,200	K,M	C0805P222(3)1X(4)C	CDR01BX222B(3)W(4)
	2,700	K	C0805P272K1X(4)C	CDR01BX272BKW(4)
	3,300	K,M	C0805P332(3)1X(4)C	CDR01BX332B(3)W(4)
50 VOLT—C0805 SIZE (MILITARY CDR01)				
BX	3,900	K	C0805P392K5X(4)C	CDR01BX392AKW(4)
	4,700	K,M	C0805P472(3)5X(4)C	CDR01BX472A(3)W(4)
100 VOLT—C1805 SIZE (MILITARY CDR02)				
BP	220	J,K	C1805P221(3)1G(4)C	CDR02BP221B(3)W(4)
	270	J	C1805P271J1G(4)C	CDR02BP271BJW(4)
BX	3,900	K	C1805P392K1X(4)C	CDR02BX392BKW(4)
	4,700	K,M	C1805P472(3)1X(4)C	CDR02BX472B(3)W(4)
	5,600	K	C1805P562K1X(4)C	CDR02BX562BKW(4)
	6,800	K,M	C1805P682(3)1X(4)C	CDR02BX682B(3)W(4)
	8,200	K	C1805P822K1X(4)C	CDR02BX822BKW(4)
	10,000	K,M	C1805P103(3)1X(4)C	CDR02BX103B(3)W(4)
50 VOLT—C1805 SIZE (MILITARY CDR02)				
BX	12,000	K	C1805P123K5X(4)C	CDR02BX123AKW(4)
	15,000	K,M	C1805P153(3)5X(4)C	CDR02BX153A(3)W(4)
	18,000	K	C1805P183K5X(4)C	CDR02BX183AKW(4)
	22,000	K,M	C1805P223(3)5X(4)C	CDR02BX223A(3)W(4)
100 VOLT—C1808 SIZE (MILITARY CDR03)				
BP	330	J,K	C1808P331(3)1G(4)C	CDR03BP331B(3)W(4)
	390	J	C1808P391J1G(4)C	CDR03BP391BJW(4)
	470	J,K	C1808P471(3)1G(4)C	CDR03BP471B(3)W(4)

CHARAC-TERISTIC	CAP. pF	AVAIL. TOL.	KEMET CAPACITORS	MIL-C-55681 PART NUMBER
100 VOLT — C1808 SIZE (MILITARY CDR03) (Cont'd)				
BP	560	J	C1808P561J1G(4)C	CDR03BP561BJW(4)
	680	J,K	C1808P681(3)1G(4)C	CDR03BP681B(3)W(4)
	820	J	C1808P821J1G(4)C	CDR03BP821BJW(4)
	1,000	J,K	C1808P102(3)1G(4)C	CDR03BP102B(3)W(4)
BX	12,000	K	C1808P123K1X(4)C	CDR03BX123BKW(4)
	15,000	K,M	C1808P153(3)1X(4)C	CDR03BX153B(3)W(4)
	18,000	K	C1808P183K1X(4)C	CDR03BX183BKW(4)
	22,000	K,M	C1808P223(3)1X(4)C	CDR03BX223B(3)W(4)
	27,000	K	C1808P273K1X(4)C	CDR03BX273BKW(4)
	33,000	K,M	C1808P333(3)1X(4)C	CDR03BX333B(3)W(4)
50 VOLT—C1808 SIZE (MILITARY CDR03)				
BX	39,000	K	C1808P393K5X(4)C	CDR03BX393AKW(4)
	47,000	K,M	C1808P473(3)5X(4)C	CDR03BX473A(3)W(4)
	56,000	K	C1808P563K5X(4)C	CDR03BX563AKW(4)
	68,000	K,M	C1808P683(3)5X(4)C	CDR03BX683A(3)W(4)
100 VOLT—C1812 SIZE (MILITARY CDR04)				
BP	1,200	J	C1812P122J1G(4)C	CDR04BP122BJW(4)
	1,500	J,K	C1812P152(3)1G(4)C	CDR04BP152B(3)W(4)
	1,800	J	C1812P182J1G(4)C	CDR04BP182BJW(4)
	2,200	J,K	C1812P222(3)1G(4)C	CDR04BP222B(3)W(4)
	2,700	J	C1812P272J1G(4)C	CDR04BP272BJW(4)
	3,300	J,K	C1812P332(3)1G(4)C	CDR04BP332B(3)W(4)
BX	39,000	K	C1812P393K1X(4)C	CDR04BX393BKW(4)
	47,000	K,M	C1812P473(3)1X(4)C	CDR04BX473B(3)W(4)
	56,000	K	C1812P563K1X(4)C	CDR04BX563BKW(4)
50 VOLT—C1812 SIZE (MILITARY CDR04)				
BX	82,000	K	C1812P823K5X(4)C	CDR04BX823AKW(4)
	100,000	K,M	C1812P104(3)5X(4)C	CDR04BX104A(3)W(4)
	120,000	K	C1812P124K5X(4)C	CDR04BX124AKW(4)
	150,000	K,M	C1812P154(3)5X(4)C	CDR04BX154A(3)W(4)
	180,000	K	C1812P184K5X(4)C	CDR04BX184AKW(4)
100 VOLT—C1825 SIZE (MILITARY CDR05)				
BP	3,900	J,K	C1825P392(3)1G(4)C	CDR05BP392B(3)W(4)
	4,700	J,K	C1825P472(3)1G(4)C	CDR05BP472B(3)W(4)
	5,600	J,K	C1825P562(3)1G(4)C	CDR05BP562B(3)W(4)
BX	68,000	K,M	C1825P683(3)1X(4)C	CDR05BX683B(3)W(4)
	82,000	K	C1825P823K1X(4)C	CDR05BX823BKW(4)
	100,000	K,M	C1825P104(3)1X(4)C	CDR05BX104B(3)W(4)
	120,000	K	C1825P124K1X(4)C	CDR05BX124BKW(4)
	150,000	K,M	C1825P154(3)1X(4)C	CDR05BX154B(3)W(4)
50 VOLT—C1825 SIZE (MILITARY CDR05)				
BX	220,000	K,M	C1825P224(3)5X(4)C	CDR05BX224A(3)W(4)
	270,000	K	C1825P274K5X(4)C	CDR05BX274AKW(4)
	330,000	K,M	C1825P334(3)5X(4)C	CDR05BX334A(3)W(4)
100 VOLT—C2225 SIZE (MILITARY CDR06)				
BP	6,800	J,K	C2225P682(3)1G(4)C	CDR06BP682B(3)W(4)
	8,200	J,K	C2225P822(3)1G(4)C	CDR06BP822B(3)W(4)
	10,000	J,K	C2225P103(3)1G(4)C	CDR06BP103B(3)W(4)
50 VOLT—C2225 SIZE (MILITARY CDR06)				
BX	390,000	K	C2225P394K5X(4)C	CDR06BX394AKW(4)
	470,000	K,M	C2225P474(3)5X(4)C	CDR06BX474A(3)W(4)

(1) To complete Part Number for Dielectric, insert P or X symbol—as defined by Military specification.
(2) To complete Part Number for Dielectric, insert G or X symbol. ("G" for Military "BP," or "X" for Military "BX.")
(3) To complete Part Number, insert Capacitance Tolerance Symbol (when applicable) as available in MIL-C-55681: B—±0.1 pF, C—±0.25 pF, D—±0.5 pF, J—±5%, K—±10%, M—±20%.
(4) To complete Part Number, insert Failure Rate Symbol: M—1.0%; P—0.1%; R—0.01%; S—.001%.

Note: All MIL-C-55681 and KEMET Part Numbers tabulated above assume use of Solderguard II (MIL-C-55681 "W" or "Y"; KEMET "C") end metalization. If Solderguard I (MIL-C-55681 "U" or "S"; KEMET "H") is required, please change designators accordingly.

RATINGS & PART NUMBER REFERENCE

CAP. pF	AVAIL. TOL.	KEMET CAPACITORS	CDR31 CAPACITORS PART NUMBER
100 VOLT—BP—C0805 SIZE (MILITARY CDR31)			
1.0	B,C	C0805N109(3)1G(4)C	CDR31BP1R0B(3)W(4)
1.1	B,C	C0805N119(3)1G(4)C	CDR31BP1R1B(3)W(4)
1.2	B,C	C0805N129(3)1G(4)C	CDR31BP1R2B(3)W(4)
1.3	B,C	C0805N139(3)1G(4)C	CDR31BP1R3B(3)W(4)
1.5	B,C	C0805N159(3)1G(4)C	CDR31BP1R5B(3)W(4)
1.6	B,C	C0805N169(3)1G(4)C	CDR31BP1R6B(3)W(4)
1.8	B,C	C0805N189(3)1G(4)C	CDR31BP1R8B(3)W(4)
2.0	B,C	C0805N209(3)1G(4)C	CDR31BP2R0B(3)W(4)
2.2	B,C	C0805N229(3)1G(4)C	CDR31BP2R2B(3)W(4)
2.4	B,C	C0805N249(3)1G(4)C	CDR31BP2R4B(3)W(4)
2.7	B,C,D	C0805N279(3)1G(4)C	CDR31BP2R7B(3)W(4)
3.0	B,C,D	C0805N309(3)1G(4)C	CDR31BP3R0B(3)W(4)
3.3	B,C,D	C0805N339(3)1G(4)C	CDR31BP3R3B(3)W(4)
3.6	B,C,D	C0805N369(3)1G(4)C	CDR31BP3R6B(3)W(4)
3.9	B,C,D	C0805N399(3)1G(4)C	CDR31BP3R9B(3)W(4)
4.3	B,C,D	C0805N439(3)1G(4)C	CDR31BP4R3B(3)W(4)
4.7	B,C,D	C0805N479(3)1G(4)C	CDR31BP4R7B(3)W(4)
5.1	B,C,D	C0805N519(3)1G(4)C	CDR31BP5R1B(3)W(4)
5.6	B,C,D	C0805N569(3)1G(4)C	CDR31BP5R6B(3)W(4)
6.2	B,C,D	C0805N629(3)1G(4)C	CDR31BP6R2B(3)W(4)
6.8	B,C,D	C0805N689(3)1G(4)C	CDR31BP6R8B(3)W(4)
7.5	B,C,D	C0805N759(3)1G(4)C	CDR31BP7R5B(3)W(4)
8.2	B,C,D	C0805N829(3)1G(4)C	CDR31BP8R2B(3)W(4)
9.1	B,C,D	C0805N919(3)1G(4)C	CDR31BP9R1B(3)W(4)
10	F,J,K	C0805N100(3)1G(4)C	CDR31BP100B(3)W(4)
11	F,J,K	C0805N110(3)1G(4)C	CDR31BP110B(3)W(4)
12	F,J,K	C0805N120(3)1G(4)C	CDR31BP120B(3)W(4)
13	F,J,K	C0805N130(3)1G(4)C	CDR31BP130B(3)W(4)
15	F,J,K	C0805N150(3)1G(4)C	CDR31BP150B(3)W(4)
16	F,J,K	C0805N160(3)1G(4)C	CDR31BP160B(3)W(4)
18	F,J,K	C0805N180(3)1G(4)C	CDR31BP180B(3)W(4)
20	F,J,K	C0805N200(3)1G(4)C	CDR31BP200B(3)W(4)
22	F,J,K	C0805N220(3)1G(4)C	CDR31BP220B(3)W(4)
24	F,J,K	C0805N240(3)1G(4)C	CDR31BP240B(3)W(4)
27	F,J,K	C0805N270(3)1G(4)C	CDR31BP270B(3)W(4)
30	F,J,K	C0805N300(3)1G(4)C	CDR31BP300B(3)W(4)
33	F,J,K	C0805N330(3)1G(4)C	CDR31BP330B(3)W(4)
36	F,J,K	C0805N360(3)1G(4)C	CDR31BP360B(3)W(4)
39	F,J,K	C0805N390(3)1G(4)C	CDR31BP390B(3)W(4)
43	F,J,K	C0805N430(3)1G(4)C	CDR31BP430B(3)W(4)
47	F,J,K	C0805N470(3)1G(4)C	CDR31BP470B(3)W(4)
51	F,J,K	C0805N510(3)1G(4)C	CDR31BP510B(3)W(4)
56	F,J,K	C0805N560(3)1G(4)C	CDR31BP560B(3)W(4)
62	F,J,K	C0805N620(3)1G(4)C	CDR31BP620B(3)W(4)
68	F,J,K	C0805N680(3)1G(4)C	CDR31BP680B(3)W(4)
75	F,J,K	C0805N750(3)1G(4)C	CDR31BP750B(3)W(4)
82	F,J,K	C0805N820(3)1G(4)C	CDR31BP820B(3)W(4)
91	F,J,K	C0805N910(3)1G(4)C	CDR31BP910B(3)W(4)
100	F,J,K	C0805N101(3)1G(4)C	CDR31BP101B(3)W(4)
110	F,J,K	C0805N111(3)1G(4)C	CDR31BP111B(3)W(4)
120	F,J,K	C0805N121(3)1G(4)C	CDR31BP121B(3)W(4)
130	F,J,K	C0805N131(3)1G(4)C	CDR31BP131B(3)W(4)
150	F,J,K	C0805N151(3)1G(4)C	CDR31BP151B(3)W(4)
160	F,J,K	C0805N161(3)1G(4)C	CDR31BP161B(3)W(4)
180	F,J,K	C0805N181(3)1G(4)C	CDR31BP181B(3)W(4)
200	F,J,K	C0805N201(3)1G(4)C	CDR31BP201B(3)W(4)
220	F,J,K	C0805N221(3)1G(4)C	CDR31BP221B(3)W(4)
240	F,J,K	C0805N241(3)1G(4)C	CDR31BP241B(3)W(4)
270	F,J,K	C0805N271(3)1G(4)C	CDR31BP271B(3)W(4)
300	F,J,K	C0805N301(3)1G(4)C	CDR31BP301B(3)W(4)
330	F,J,K	C0805N331(3)1G(4)C	CDR31BP331B(3)W(4)
360	F,J,K	C0805N361(3)1G(4)C	CDR31BP361B(3)W(4)
390	F,J,K	C0805N391(3)1G(4)C	CDR31BP391B(3)W(4)
430	F,J,K	C0805N431(3)1G(4)C	CDR31BP431B(3)W(4)
470	F,J,K	C0805N471(3)1G(4)C	CDR31BP471B(3)W(4)
50 VOLT—BP—C0805 SIZE (MILITARY CDR31)			
510	F,J,K	C0805N511(3)5G(4)C	CDR31BP511A(3)W(4)
560	F,J,K	C0805N561(3)5G(4)C	CDR31BP561A(3)W(4)
620	F,J,K	C0805N621(3)5G(4)C	CDR31BP621A(3)W(4)
680	F,J,K	C0805N681(3)5G(4)C	CDR31BP681A(3)W(4)
100 VOLT—BX—C0805 SIZE (MILITARY CDR31)			
470	K,M	C0805N471(3)1X(4)C	CDR31BX471B(3)W(4)
560	K,M	C0805N561(3)1X(4)C	CDR31BX561B(3)W(4)
680	K,M	C0805N681(3)1X(4)C	CDR31BX681B(3)W(4)
820	K,M	C0805N821(3)1X(4)C	CDR31BX821B(3)W(4)
1,000	K,M	C0805N102(3)1X(4)C	CDR31BX102B(3)W(4)
1,200	K,M	C0805N122(3)1X(4)C	CDR31BX122B(3)W(4)
1,500	K,M	C0805N152(3)1X(4)C	CDR31BX152B(3)W(4)
1,800	K,M	C0805N182(3)1X(4)C	CDR31BX182B(3)W(4)
2,200	K,M	C0805N222(3)1X(4)C	CDR31BX222B(3)W(4)
2,700	K,M	C0805N272(3)1X(4)C	CDR31BX272B(3)W(4)
3,300	K,M	C0805N332(3)1X(4)C	CDR31BX332B(3)W(4)
3,900	K,M	C0805N392(3)1X(4)C	CDR31BX392B(3)W(4)
4,700	K,M	C0805N472(3)1X(4)C	CDR31BX472B(3)W(4)
50 VOLT—BX—C0805 SIZE (MILITARY CDR31)			
5,600	K,M	C0805N562(3)5X(4)C	CDR31BX562A(3)W(4)
6,800	K,M	C0805N682(3)5X(4)C	CDR31BX682A(3)W(4)
8,200	K,M	C0805N822(3)5X(4)C	CDR31BX822A(3)W(4)
10,000	K,M	C0805N103(3)5X(4)C	CDR31BX103A(3)W(4)
12,000	K,M	C0805N123(3)5X(4)C	CDR31BX123A(3)W(4)
15,000	K,M	C0805N153(3)5X(4)C	CDR31BX153A(3)W(4)
18,000	K,M	C0805N183(3)5X(4)C	CDR31BX183A(3)W(4)

(1) To complete Part Number for Dielectric, insert P or X symbol—as defined by Military specification.
(2) To complete Part Number for Dielectric, insert G or X symbol. ("G" for Military "BP," or "X" for Military "BX.")
(3) To complete Part Number, insert Capacitance Tolerance Symbol (when applicable) as available in MIL-C-55681: B—±0.1 pF, C—±0.25 pF, D—±0.5 pF, J—±5%, K—±10%, M—±20%.
(4) To complete Part Number, insert Failure Rate Symbol: M—1.0%; P—0.1%; R—0.01%; S—.001%.

Note: All MIL-C-55681 and KEMET Part Numbers tabulated above assume use of Solderguard II (MIL-C-55681 "W" or "Y"; KEMET "C") end metalization. If Solderguard I (MIL-C-55681 "U" or "S"; KEMET "H") is required, please change designators accordingly.

RATINGS & PART NUMBER REFERENCE

CAP. pF	AVAIL. TOL.	KEMET CAPACITORS	CDR32 CAPACITORS PART NUMBER
100 VOLT—BP—C1206 SIZE (MILITARY CDR32)			
1.0	B,C	C1206N109(3)1G(4)C	CDR32BP1R0B(3)W(4)
1.1	B,C	C1206N119(3)1G(4)C	CDR32BP1R1B(3)W(4)
1.2	B,C	C1206N129(3)1G(4)C	CDR32BP1R2B(3)W(4)
1.3	B,C	C1206N139(3)1G(4)C	CDR32BP1R3B(3)W(4)
1.5	B,C	C1206N159(3)1G(4)C	CDR32BP1R5B(3)W(4)
1.6	B,C	C1206N169(3)1G(4)C	CDR32BP1R6B(3)W(4)
1.8	B,C	C1206N189(3)1G(4)C	CDR32BP1R8B(3)W(4)
2.0	B,C	C1206N209(3)1G(4)C	CDR32BP2R0B(3)W(4)
2.2	B,C	C1206N229(3)1G(4)C	CDR32BP2R2B(3)W(4)
2.4	B,C	C1206N249(3)1G(4)C	CDR32BP2R4B(3)W(4)
2.7	B,C,D	C1206N279(3)1G(4)C	CDR32BP2R7B(3)W(4)
3.0	B,C,D	C1206N309(3)1G(4)C	CDR32BP3R0B(3)W(4)
3.3	B,C,D	C1206N339(3)1G(4)C	CDR32BP3R3B(3)W(4)
3.6	B,C,D	C1206N369(3)1G(4)C	CDR32BP3R6B(3)W(4)
3.9	B,C,D	C1206N399(3)1G(4)C	CDR32BP3R9B(3)W(4)
4.3	B,C,D	C1206N439(3)1G(4)C	CDR32BP4R3B(3)W(4)
4.7	B,C,D	C1206N479(3)1G(4)C	CDR32BP4R7B(3)W(4)
5.1	B,C,D	C1206N519(3)1G(4)C	CDR32BP5R1B(3)W(4)
5.6	B,C,D	C1206N569(3)1G(4)C	CDR32BP5R6B(3)W(4)
6.2	B,C,D	C1206N629(3)1G(4)C	CDR32BP6R2B(3)W(4)
6.8	B,C,D	C1206N689(3)1G(4)C	CDR32BP6R8B(3)W(4)
7.5	B,C,D	C1206N759(3)1G(4)C	CDR32BP7R5B(3)W(4)
8.2	B,C,D	C1206N829(3)1G(4)C	CDR32BP8R2B(3)W(4)
9.1	B,C,D	C1206N919(3)1G(4)C	CDR32BP9R1B(3)W(4)
10	F,J,K	C1206N100(3)1G(4)C	CDR32BP100B(3)W(4)
11	F,J,K	C1206N110(3)1G(4)C	CDR32BP110B(3)W(4)
12	F,J,K	C1206N120(3)1G(4)C	CDR32BP120B(3)W(4)
13	F,J,K	C1206N130(3)1G(4)C	CDR32BP130B(3)W(4)
15	F,J,K	C1206N150(3)1G(4)C	CDR32BP150B(3)W(4)
16	F,J,K	C1206N160(3)1G(4)C	CDR32BP160B(3)W(4)
18	F,J,K	C1206N180(3)1G(4)C	CDR32BP180B(3)W(4)
20	F,J,K	C1206N200(3)1G(4)C	CDR32BP200B(3)W(4)
22	F,J,K	C1206N220(3)1G(4)C	CDR32BP220B(3)W(4)
24	F,J,K	C1206N240(3)1G(4)C	CDR32BP240B(3)W(4)
27	F,J,K	C1206N270(3)1G(4)C	CDR32BP270B(3)W(4)
30	F,J,K	C1206N300(3)1G(4)C	CDR32BP300B(3)W(4)
33	F,J,K	C1206N330(3)1G(4)C	CDR32BP330B(3)W(4)
36	F,J,K	C1206N360(3)1G(4)C	CDR32BP360B(3)W(4)
39	F,J,K	C1206N390(3)1G(4)C	CDR32BP390B(3)W(4)
43	F,J,K	C1206N430(3)1G(4)C	CDR32BP430B(3)W(4)
47	F,J,K	C1206N470(3)1G(4)C	CDR32BP470B(3)W(4)
51	F,J,K	C1206N510(3)1G(4)C	CDR32BP510B(3)W(4)
56	F,J,K	C1206N560(3)1G(4)C	CDR32BP560B(3)W(4)
62	F,J,K	C1206N620(3)1G(4)C	CDR32BP620B(3)W(4)
68	F,J,K	C1206N680(3)1G(4)C	CDR32BP680B(3)W(4)
75	F,J,K	C1206N750(3)1G(4)C	CDR32BP750B(3)W(4)
82	F,J,K	C1206N820(3)1G(4)C	CDR32BP820B(3)W(4)
91	F,J,K	C1206N910(3)1G(4)C	CDR32BP910B(3)W(4)
100	F,J,K	C1206N101(3)1G(4)C	CDR32BP101B(3)W(4)

CAP. pF	AVAIL. TOL.	KEMET CAPACITORS	CDR32 CAPACITORS PART NUMBER
100 VOLT—BP—C1206 SIZE (MILITARY CDR32) (Cont'd)			
110	F,J,K	C1206N111(3)1G(4)C	CDR32BP111B(3)W(4)
120	F,J,K	C1206N121(3)1G(4)C	CDR32BP121B(3)W(4)
130	F,J,K	C1206N131(3)1G(4)C	CDR32BP131B(3)W(4)
150	F,J,K	C1206N151(3)1G(4)C	CDR32BP151B(3)W(4)
160	F,J,K	C1206N161(3)1G(4)C	CDR32BP161B(3)W(4)
180	F,J,K	C1206N181(3)1G(4)C	CDR32BP181B(3)W(4)
200	F,J,K	C1206N201(3)1G(4)C	CDR32BP201B(3)W(4)
220	F,J,K	C1206N221(3)1G(4)C	CDR32BP221B(3)W(4)
240	F,J,K	C1206N241(3)1G(4)C	CDR32BP241B(3)W(4)
270	F,J,K	C1206N271(3)1G(4)C	CDR32BP271B(3)W(4)
300	F,J,K	C1206N301(3)1G(4)C	CDR32BP301B(3)W(4)
330	F,J,K	C1206N331(3)1G(4)C	CDR32BP331B(3)W(4)
360	F,J,K	C1206N361(3)1G(4)C	CDR32BP361B(3)W(4)
390	F,J,K	C1206N391(3)1G(4)C	CDR32BP391B(3)W(4)
430	F,J,K	C1206N431(3)1G(4)C	CDR32BP431B(3)W(4)
470	F,J,K	C1206N471(3)1G(4)C	CDR32BP471B(3)W(4)
510	F,J,K	C1206N511(3)1G(4)C	CDR32BP511B(3)W(4)
560	F,J,K	C1206N561(3)1G(4)C	CDR32BP561B(3)W(4)
620	F,J,K	C1206N621(3)1G(4)C	CDR32BP621B(3)W(4)
680	F,J,K	C1206N681(3)1G(4)C	CDR32BP681B(3)W(4)
750	F,J,K	C1206N751(3)1G(4)C	CDR32BP751B(3)W(4)
820	F,J,K	C1206N821(3)1G(4)C	CDR32BP821B(3)W(4)
910	F,J,K	C1206N911(3)1G(4)C	CDR32BP911B(3)W(4)
1,000	F,J,K	C1206N102(3)1G(4)C	CDR32BP102B(3)W(4)
50 VOLT—BP—C1206 SIZE (MILITARY CDR32)			
1,100	F,J,K	C1206N112(3)5G(4)C	CDR32BP112A(3)W(4)
1,200	F,J,K	C1206N122(3)5G(4)C	CDR32BP122A(3)W(4)
1,300	F,J,K	C1206N132(3)5G(4)C	CDR32BP132A(3)W(4)
1,500	F,J,K	C1206N152(3)5G(4)C	CDR32BP152A(3)W(4)
1,600	F,J,K	C1206N162(3)5G(4)C	CDR32BP162A(3)W(4)
1,800	F,J,K	C1206N182(3)5G(4)C	CDR32BP182A(3)W(4)
2,000	F,J,K	C1206N202(3)5G(4)C	CDR32BP202A(3)W(4)
2,200	F,J,K	C1206N222(3)5G(4)C	CDR32BP222A(3)W(4)
100 VOLT — BX — C1206 SIZE (MILITARY CDR32)			
4,700	K,M	C1206N472(3)1X(4)C	CDR32BX472B(3)W(4)
5,600	K,M	C1206N562(3)1X(4)C	CDR32BX562B(3)W(4)
6,800	K,M	C1206N682(3)1X(4)C	CDR32BX682B(3)W(4)
8,200	K,M	C1206N822(3)1X(4)C	CDR32BX822B(3)W(4)
10,000	K,M	C1206N103(3)1X(4)C	CDR32BX103B(3)W(4)
12,000	K,M	C1206N123(3)1X(4)C	CDR32BX123B(3)W(4)
15,000	K,M	C1206N153(3)1X(4)C	CDR32BX153B(3)W(4)
50 VOLT — BX — C1206 SIZE (MILITARY CDR32)			
18,000	K,M	C1206N183(3)5X(4)C	CDR32BX183A(3)W(4)
22,000	K,M	C1206N223(3)5X(4)C	CDR32BX223A(3)W(4)
27,000	K,M	C1206N273(3)5X(4)C	CDR32BX273A(3)W(4)
33,000	K,M	C1206N333(3)5X(4)C	CDR32BX333A(3)W(4)
39,000	K,M	C1206N393(3)5X(4)C	CDR32BX393A(3)W(4)

(1) To complete Part Number for Dielectric, insert P or X symbol—as defined by Military specification.
(2) To complete Part Number for Dielectric, insert G or X symbol. ("G" for Military "BP," or "X" for Military "BX.")
(3) To complete Part Number, insert Capacitance Tolerance Symbol (when applicable) as available in MIL-C-55681: B—±0.1 pF, C—±0.25 pF, D—±0.5 pF, J—±5%, K—±10%, M—±20%.
(4) To complete Part Number, insert Failure Rate Symbol: M—1.0%; P—0.1%; R—0.01%; S—.001%.

Note: All MIL-C-55681 and KEMET Part Numbers tabulated above assume use of Solderguard II (MIL-C-55681 "W" or "Y"; KEMET "C") end metalization. If Solderguard I (MIL-C-55681 "U" or "S"; KEMET "H") is required, please change designators accordingly.

RATINGS & PART NUMBER REFERENCE

CAP. pF	AVAIL. TOL.	KEMET CAPACITORS	CDR33, 34, 35 CAPACITORS PART NUMBER
100 VOLT—BP—C1210 SIZE (MILITARY CDR33)			
1,000	F,J,K	C1210N102(3)1G(4)C	CDR33BP102B(3)W(4)
1,100	F,J,K	C1210N112(3)1G(4)C	CDR33BP112B(3)W(4)
1,200	F,J,K	C1210N122(3)1G(4)C	CDR33BP122B(3)W(4)
1,300	F,J,K	C1210N132(3)1G(4)C	CDR33BP132B(3)W(4)
1,500	F,J,K	C1210N152(3)1G(4)C	CDR33BP152B(3)W(4)
1,600	F,J,K	C1210N162(3)1G(4)C	CDR33BP162B(3)W(4)
1,800	F,J,K	C1210N182(3)1G(4)C	CDR33BP182B(3)W(4)
2,000	F,J,K	C1210N202(3)1G(4)C	CDR33BP202B(3)W(4)
2,200	F,J,K	C1210N222(3)1G(4)C	CDR33BP222B(3)W(4)
50 VOLT—BP—C1210 SIZE (MILITARY CDR33)			
2,400	F,J,K	C1210N242(3)5G(4)C	CDR33BP242A(3)W(4)
2,700	F,J,K	C1210N272(3)5G(4)C	CDR33BP272A(3)W(4)
3,000	F,J,K	C1210N302(3)5G(4)C	CDR33BP302A(3)W(4)
3,300	F,J,K	C1210N332(3)5G(4)C	CDR33BP332A(3)W(4)
100 VOLT—BX—C1210 SIZE (MILITARY CDR33)			
15,000	K,M	C1210N153(3)1X(4)C	CDR33BX153B(3)W(4)
18,000	K,M	C1210N183(3)1X(4)C	CDR33BX183B(3)W(4)
22,000	K,M	C1210N223(3)1X(4)C	CDR33BX223B(3)W(4)
27,000	K,M	C1210N273(3)1X(4)C	CDR33BX273B(3)W(4)
50 VOLT—BX—C1210 SIZE (MILITARY CDR33)			
39,000	K,M	C1210N393(3)5X(4)C	CDR33BX393A(3)W(4)
47,000	K,M	C1210N473(3)5X(4)C	CDR33BX473A(3)W(4)
56,000	K,M	C1210N563(3)5X(4)C	CDR33BX563A(3)W(4)
68,000	K,M	C1210N683(3)5X(4)C	CDR33BX683A(3)W(4)
82,000	K,M	C1210N823(3)5X(4)C	CDR33BX823A(3)W(4)
100,000	K,M	C1210N104(3)5X(4)C	CDR33BX104A(3)W(4)
100 VOLT—BP—C1812 SIZE (MILITARY CDR34)			
2,200	F,J,K	C1812N222(3)1G(4)C	CDR34BP222B(3)W(4)
2,400	F,J,K	C1812N242(3)1G(4)C	CDR34BP242B(3)W(4)
2,700	F,J,K	C1812N272(3)1G(4)C	CDR34BP272B(3)W(4)
3,000	F,J,K	C1812N302(3)1G(4)C	CDR34BP302B(3)W(4)
3,300	F,J,K	C1812N332(3)1G(4)C	CDR34BP332B(3)W(4)
3,600	F,J,K	C1812N362(3)1G(4)C	CDR34BP362B(3)W(4)
3,900	F,J,K	C1812N392(3)1G(4)C	CDR34BP392B(3)W(4)
4,300	F,J,K	C1812N432(3)1G(4)C	CDR34BP432B(3)W(4)
4,700	F,J,K	C1812N472(3)1G(4)C	CDR34BP472B(3)W(4)
50 VOLT—BP—C1812 SIZE (MILITARY CDR34)			
5,100	F,J,K	C1812N512(3)5G(4)C	CDR34BP512A(3)W(4)
5,600	F,J,K	C1812N562(3)5G(4)C	CDR34BP562A(3)W(4)
6,200	F,J,K	C1812N622(3)5G(4)C	CDR34BP622A(3)W(4)
6,800	F,J,K	C1812N682(3)5G(4)C	CDR34BP682A(3)W(4)
7,500	F,J,K	C1812N752(3)5G(4)C	CDR34BP752A(3)W(4)
8,200	F,J,K	C1812N822(3)5G(4)C	CDR34BP822A(3)W(4)
9,100	F,J,K	C1812N912(3)5G(4)C	CDR34BP912A(3)W(4)
10,000	F,J,K	C1812N103(3)5G(4)C	CDR34BP103A(3)W(4)

CAP. pF	AVAIL. TOL.	KEMET CAPACITORS	CDR33, 34, 35 CAPACITORS PART NUMBER
100 VOLT—BX—C1812 SIZE (MILITARY CDR34)			
27,000	K,M	C1812N273(3)1X(4)C	CDR34BX273B(3)W(4)
33,000	K,M	C1812N333(3)1X(4)C	CDR34BX333B(3)W(4)
39,000	K,M	C1812N393(3)1X(4)C	CDR34BX393B(3)W(4)
47,000	K,M	C1812N473(3)1X(4)C	CDR34BX473B(3)W(4)
56,000	K,M	C1812N563(3)1X(4)C	CDR34BX563B(3)W(4)
50 VOLT—BX—C1812 SIZE (MILITARY CDR34)			
100,000	K,M	C1812N104(3)5X(4)C	CDR34BX104A(3)W(4)
120,000	K,M	C1812N124(3)5X(4)C	CDR34BX124A(3)W(4)
150,000	K,M	C1812N154(3)5X(4)C	CDR34BX154A(3)W(4)
180,000	K,M	C1812N184(3)5X(4)C	CDR34BX184A(3)W(4)
100 VOLT—BP—C1825 SIZE (MILITARY CDR35)			
4,700	F,J,K	C1825N472(3)1G(4)C	CDR35BP472B(3)W(4)
5,100	F,J,K	C1825N512(3)1G(4)C	CDR35BP512B(3)W(4)
5,600	F,J,K	C1825N562(3)1G(4)C	CDR35BP562B(3)W(4)
6,200	F,J,K	C1825N622(3)1G(4)C	CDR35BP622B(3)W(4)
6,800	F,J,K	C1825N682(3)1G(4)C	CDR35BP682B(3)W(4)
7,500	F,J,K	C1825N752(3)1G(4)C	CDR35BP752B(3)W(4)
8,200	F,J,K	C1825N822(3)1G(4)C	CDR35BP822B(3)W(4)
9,100	F,J,K	C1825N912(3)1G(4)C	CDR35BP912B(3)W(4)
10,000	F,J,K	C1825N103(3)1G(4)C	CDR35BP103B(3)W(4)
50 VOLT—BP—C1825 SIZE (MILITARY CDR35)			
11,000	F,J,K	C1825N113(3)5G(4)C	CDR35BP113A(3)W(4)
12,000	F,J,K	C1825N123(3)5G(4)C	CDR35BP123A(3)W(4)
13,000	F,J,K	C1825N133(3)5G(4)C	CDR35BP133A(3)W(4)
15,000	F,J,K	C1825N153(3)5G(4)C	CDR35BP153A(3)W(4)
16,000	F,J,K	C1825N163(3)5G(4)C	CDR35BP163A(3)W(4)
18,000	F,J,K	C1825N183(3)5G(4)C	CDR35BP183A(3)W(4)
20,000	F,J,K	C1825N203(3)5G(4)C	CDR35BP203A(3)W(4)
22,000	F,J,K	C1825N223(3)5G(4)C	CDR35BP223A(3)W(4)
100 VOLT—BX—C1825 SIZE (MILITARY CDR35)			
56,000	K,M	C1825N563(3)1X(4)C	CDR35BX563B(3)W(4)
68,000	K,M	C1825N683(3)1X(4)C	CDR35BX683B(3)W(4)
82,000	K,M	C1825N823(3)1X(4)C	CDR35BX823B(3)W(4)
100,000	K,M	C1825N104(3)1X(4)C	CDR35BX104B(3)W(4)
120,000	K,M	C1825N124(3)1X(4)C	CDR35BX124B(3)W(4)
150,000	K,M	C1825N154(3)1X(4)C	CDR35BX154B(3)W(4)
50 VOLT—BX—C1825 SIZE (MILITARY CDR35)			
180,000	K,M	C1825N184(3)5X(4)C	CDR35BX184A(3)W(4)
220,000	K,M	C1825N224(3)5X(4)C	CDR35BX224A(3)W(4)
270,000	K,M	C1825N274(3)5X(4)C	CDR35BX274A(3)W(4)
330,000	K,M	C1825N334(3)5X(4)C	CDR35BX334A(3)W(4)
390,000	K,M	C1825N394(3)5X(4)C	CDR35BX394A(3)W(4)
470,000	K,M	C1825N474(3)5X(4)C	CDR35BX474A(3)W(4)

(1) To complete Part Number for Dielectric, insert P or X symbol—as defined by Military specification.
(2) To complete Part Number for Dielectric, insert G or X symbol. ("G" for Military "BP," or "X" for Military "BX.")
(3) To complete Part Number, insert Capacitance Tolerance Symbol (when applicable) as available in MIL-C-55681: B— ±0.1 pF, C— ±0.25 pF, D— ±0.5 pF, J— ±5%, K— ±10%, M— ±20%.
(4) To complete Part Number, insert Failure Rate Symbol: M—1.0%; P—0.1%; R—0.01%; S—.001%.

Note: All MIL-C-55681 and KEMET Part Numbers tabulated above assume use of Solderguard II (MIL-C-55681 "W" or "Y"; KEMET "C") end metalization. If Solderguard I (MIL-C-55681 "U" or "S"; KEMET "H") is required, please change designators accordingly.

MILITARY (MIL-C-55681)
ESTABLISHED RELIABILITY

OPTIONAL MARKING PER MIL-C-55681 (Same as EIA-A Code)

Chips are normally supplied unmarked. However, as an option, they may be marked with a single colored alphanumeric character to indicate capacitance value, or laser marked.

INK MARKING

TABLE I

CHAR	CODE	CHAR	CODE
A	10	R	33
B	11	S	36
C	12	T	39
D	13	V	43
E	15	W	47
H	16	X	51
I	18	Y	56
J	20	Z	62
K	22	3	68
L	24	4	75
N	27	7	82
O	30	9	91

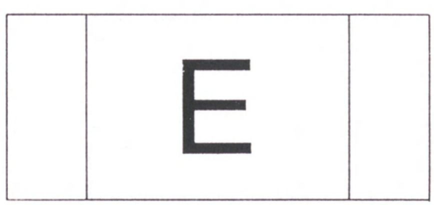
TABLE II

COLOR	MULTIPLIER	CAP CODE (LAST DIGIT)
ORANGE	X0.1	(XX9)
BLACK	X1.0	(XX0)
GREEN	X10.0	(XX1)
BLUE	X100.0	(XX2)
VIOLET	X1,000.0	(XX3)
RED	X10,000.0	(XX4)

INSTRUCTIONS

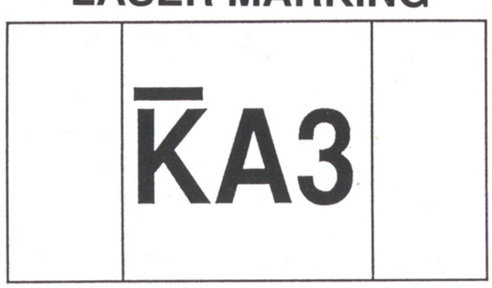
1. Find first two (2) digits of the cap code in the CODE column in Table I.
2. Follow across to CHAR column in Table I to determine the character that is to be marked on the chip.
3. Find the last digit of the cap code in the CAP CODE column in Table II.
4. Follow across to the COLOR column in Table II.
5. This colored character (or colored background) is now the specified marking.

Example of ink marking on chip. (15 pF)



15 pF: 150 Cap Code
First 2 digits: 15
Corresponding
Character: E
Last digit: 0
Corresponding
Color: Black
Thus 15 pF: Black "E"

LASER MARKING



Uses K Bar to identify KEMET, and 2 characters to identify capacitance. The 2nd character identifies digits, and the 3rd character identifies multiplier of capacitance.

KEMET Electronics Corporation, P.O. Box 5928, Greenville, S.C. 29606, (803) 963-6300

HIGH RELIABILITY—GR900

GR900 capacitors are intended for use in any application where the chance of failure must be reduced to the lowest possible level. While any well-made multilayer ceramic capacitor is an inherently reliable device, GR900 capacitors receive special attention in all phases of manufacture including:

- — Raw Materials Selection
- — Special Designs
- — Clean Room Production
- — Individual Batch Testing
- — Ultrasonic Scanning (when applicable)
- — Singular Batch identity is maintained
- — Destructive Physical Analysis

These parts are well worth the added investment in comparison to the cost of a device or system failure.

Typical applications include:

1. Medical: heart pacemakers, pain control devices, life signs monitoring, eyesight improvement and electroencephalographic equipment.
2. Aerospace: space exploration (Viking, Apollo, Venus Lander, etc.); Communications Satellites; Space Shuttle/IUS; Sky Lab.

SCREENING AND SAMPLE TESTS

Each batch receives the following testing/inspections:

Preliminary:

1. Destructive Physical Analysis: (DPA) — A sample is pulled from each lot and examined per EIA, RS-469 and KEMET's strict internal void and delamination criteria.

Sampling Plan:

Lot Size	Minimum Sample Size	Accept	Reject
1 - 500	14	0	1
501 - 10,000	32	1	2
10,001 - 35,000	50	2	3
35,001 - 500,000	80	3	4

2. Ultrasonic Scanning — May be performed on batches failing to meet the DPA criteria for removal of marginal product. Not required on each lot.

Group A

1. **Thermal Shock** — Materials used in the construction of multilayer ceramic capacitors possess various thermal co-efficients of expansion. To assure maximum uniformity, each part is temperature cycled in accordance to MIL-STD-202, Method 107, Condition A with Step 3 being 125°C. Number of cycles shall be 20 (100% of lot).
2. **Voltage Conditioning** — One of the most strenuous environments for any capacitor is the high temperature/high voltage test. All units are subject to twice rated voltage to the units at the maximum rated temperature of 125°C for a minimum of 168 hours and a maximum of 264 hours. The voltage conditioning may be terminated at any time during 168 hours to 264 hours time interval that confirmed failures meet the requirements of the PDA during the last 48 hours of 2 units or .04% (100% of lot).

   Optional Voltage Conditioning (Accelerated Voltage Conditioning): All conditions of the Standard Voltage Conditioning apply with the exception of the increased voltage and the decreased test times. The minimum time duration, T (test), shall be calculated as follows:

   $$T\ (\text{test}) = \frac{800}{(E\ \text{test} / E\ \text{rated})^3}$$

   where: $2 \times E\ \text{rated} \leqslant E\ \text{test} \leqslant 4 \times E\ \text{rated}$

   T (test) = Minimum test time in hours
   E test = Applied voltage
   E rated = Rated voltage of the capacitor

3. **Insulation Resistance** — The 125°C measurement with rated voltage applied shall be the lesser of 10,000 megohms or 100 megohms-microfarads (100% of lot).
4. **Dielectric Withstanding Voltage** — Voltage applied will always exceed 2.5 times the 25°C rated voltage. KEMET's standard internal test condition is 4 times the 25°C rated voltage (100% of lot).
5. **Insulation Resistance** — The 25°C measurement with rated voltage applied shall be the lesser of 200,000 megohms or 2000 megohm-microfarads. (This is twice the military requirements.) (100% of lot.)
6. **Storage at 150°C** for 2 hours minimum without voltage applied followed by a 12-hour minimum stabilization period (temperature characteristic BX only).
7. **Capacitance** — Shall be within specified tolerance at 25°C (100% of lot). (Aging phenomenon is taken into account for BX dielectric to obtain capacitance.)
8. **Dissipation Factor** — Shall not exceed 2.5% for X7R (BX) dielectric, 0.15% for NPO (BP dielectric at 25°C. (100% of lot.)
9. **Percent Defective Allowable** (PDA) — The overall PDA is 8%. The PDA includes steps 1 through 8 above with the following exceptions. Capacitance exclusion — capacitance values no more than 5% or .5pF, whichever is greater for BX characteristic or 1% or .3pF, whichever is greater for BP characteristic beyond specified tolerance limit shall be removed from the lot but shall not be considered defective for determination of PDA.

   Insulation Resistance at 25°C — Product which is not acceptable for twice the military limit but is acceptable per the military limit, is removed from the lot but shall not be considered defective for determination of the PDA.
10. **Visual and Mechanical Examination** — Performed on each lot based on a .65 AQL, Level II of MIL-STD-105. Criteria per MIL-C-123.
11. **Destructive Physical Analysis** (DPA) — A sample is examined on each lot per EIA RS-469. Sampling plan per MIL-C-123.

STANDARD PACKAGING

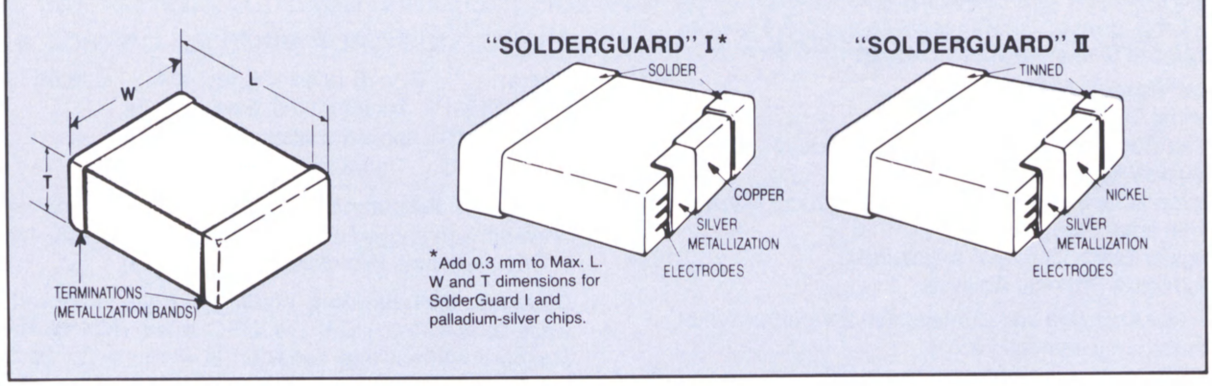
Product is packaged in chip trays.

DATA PACKAGE

A data package is sent with each shipment which contains:

1. Destructive Physical Analysis (DPA) photograph representing the lot shipped.
2. Certificate of Compliance stating that the parts meet all applicable requirements of the appropriate military specification to the best failure level to which KEMET is approved.
3. Summary of Group A testing.

CAPACITOR OUTLINE DRAWINGS



Dimensions—Millimeters & (Inches)

Size Code	L Length	W Width	T Thickness Max.
0805	2.03 (.080) ± 0.38 (.015)	1.27 (.050) ± 0.38 (.015)	1.4 (.055)
1005	2.56 (.100) ± 0.38 (.015)	1.27 (.050) ± 0.38 (.015)	1.5 (.059)
1206	3.07 (.120) ± 0.38 (.015)	1.52 (.060) ± 0.38 (.015)	1.6 (.065)
1210	3.07 (.120) ± 0.38 (.015)	2.56 (.100) ± 0.38 (.015)	1.6 (.065)
1805	4.57 (.180) ± 0.38 (.015)	1.27 (.050) ± 0.38 (.015)	1.4 (.055)
1808	4.57 (.180) ± 0.38 (.015)	2.03 (.080) ± 0.38 (.015)	1.6 (.065)
1812	4.57 (.180) ± 0.38 (.015)	3.18 (.125) ± 0.38 (.015)	2.03 (.080)
1825	4.57 (.180) + 0.51 - 0.38	6.35 (.250) + 0.51 - 0.38	2.03 (.080)
	(+.020 - .015)	(+.020 - .015)	—
2225	5.72 (.225) ± 0.51 (.020)	6.35 (.250) ± 0.51 (.020)	2.03 (.080)

ORDERING INFORMATION

C 0805 A 103 K 5 X A C

CERAMIC — C

SIZE CODE — 0805
See table above

SPECIFICATION — A
A — KEMET GR900 (CHIPS)

CAPACITANCE CODE — 103
Expressed in Picofarads (pF)
First two digit-significant figures.
Third digit-number of zeros. (Use 9 for 1.0 thru 9.9 pF.
Example: 2.2 pF — 229).

CAPACITANCE TOLERANCE — K

M — ± 20%	G — ± 2% (G(BP) Temperature Characteristic Only)
K — ± 10%	F — ± 1% (G(BP) Temperature Characteristic Only)
J — ± 5%	*D — ± 0.5 pF (G(BP) Temperature Characteristic Only)
	*C — ± 0.25 pF (G(BP) Temperature Characteristic Only)
	X — Other

*These tolerances available only for 1.0 through 10 pF capacitors.

VOLTAGE — 5
1 — 100　5 — 50
2 — 200　0 — Other

TEMPERATURE CHARACTERISTIC — X
Designated by Capacitance Change over Temperature Range
G — BP (± 30 PPM/°C)
X — BX (± 15%, + 15%, - 25% with bias)

FAILURE RATE LEVEL (%/1,000 HOURS) — A
A — Standard — meets or exceeds MIL-C-55681, level S

END METALLIZATION — C
C — Tin-Coated, Final (SolderGuard II)
H — Solder-Coated, Final (SolderGuard I)
T — Silver
G — Gold Plated
V — Palladium Silver (Standard-Untinned)
Z — Other

RATINGS AND PART NUMBER REFERENCE
STYLE C0805

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
1.0	C0805A109(1)2GA(2)
1.1	C0805A119(1)2GA(2)
1.2	C0805A129(1)2GA(2)
1.5	C0805A159(1)2GA(2)
1.6	C0805A169(1)2GA(2)
1.8	C0805A189(1)2GA(2)
2.0	C0805A209(1)2GA(2)
2.2	C0805A229(1)2GA(2)
2.4	C0805A249(1)2GA(2)
2.7	C0805A279(1)2GA(2)
3.0	C0805A309(1)2GA(2)
3.3	C0805A339(1)2GA(2)
3.6	C0805A369(1)2GA(2)
3.9	C0805A399(1)2GA(2)
4.3	C0805A439(1)2GA(2)
4.7	C0805A479(1)2GA(2)
5.1	C0805A519(1)2GA(2)
5.6	C0805A569(1)2GA(2)
6.2	C0805A629(1)2GA(2)
6.8	C0805A689(1)2GA(2)
7.5	C0805A759(1)2GA(2)
8.2	C0805A829(1)2GA(2)
9.1	C0805A919(1)2GA(2)
10.0	C0805A100(1)2GA(2)
11.0	C0805A110(1)2GA(2)
12.0	C0805A120(1)2GA(2)
13.0	C0805A130(1)2GA(2)
15.0	C0805A150(1)2GA(2)
16.0	C0805A160(1)2GA(2)
18.0	C0805A180(1)2GA(2)
20.0	C0805A200(1)2GA(2)
22.0	C0805A220(1)2GA(2)
24.0	C0805A240(1)2GA(2)
27.0	C0805A270(1)2GA(2)
30.0	C0805A300(1)2GA(2)
33.0	C0805A330(1)2GA(2)
36.0	C0805A360(1)2GA(2)
39.0	C0805A390(1)2GA(2)
43.0	C0805A430(1)2GA(2)
47.0	C0805A470(1)2GA(2)
51.0	C0805A510(1)2GA(2)
56.0	C0805A560(1)2GA(2)
62.0	C0805A620(1)2GA(2)
75.0	C0805A750(1)2GA(2)
82.0	C0805A820(1)2GA(2)
91.0	C0805A910(1)2GA(2)
100	C0805A101(1)2GA(2)
110	C0805A111(1)2GA(2)
120	C0805A121(1)2GA(2)
130	C0805A131(1)2GA(2)
150	C0805A151(1)2GA(2)
160	C0805A161(1)2GA(2)
180	C0805A181(1)2GA(2)
200	C0805A201(1)2GA(2)
220	C0805A221(1)2GA(2)
100 VOLT — BP	
240	C0805A241(1)1GA(2)
270	C0805A271(1)1GA(2)
300	C0805A301(1)1GA(2)
330	C0805A331(1)1GA(2)
360	C0805A361(1)1GA(2)
390	C0805A391(1)1GA(2)
430	C0805A431(1)1GA(2)
470	C0805A471(1)1GA(2)
50 VOLT — BP	
510	C0805A511(1)5GA(2)
560	C0805A561(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
180	C0805A181(1)2XA(2)
220	C0805A221(1)2XA(2)
270	C0805A271(1)2XA(2)
330	C0805A331(1)2XA(2)
390	C0805A391(1)2XA(2)
470	C0805A471(1)2XA(2)
560	C0805A561(1)2XA(2)
680	C0805A681(1)2XA(2)
820	C0805A821(1)2XA(2)
100 VOLT — BX	
1000	C0805A102(1)1XA(2)
1200	C0805A122(1)1XA(2)
1500	C0805A152(1)1XA(2)
1800	C0805A182(1)1XA(2)
2200	C0805A222(1)1XA(2)
2700	C0805A272(1)1XA(2)
3300	C0805A332(1)1XA(2)
3900	C0805A392(1)1XA(2)
4700	C0805A472(1)1XA(2)
50 VOLT — BX	
5600	C0805A562(1)5XA(2)
6800	C0805A682(1)5XA(2)
8200	C0805A822(1)5XA(2)
10,000	C0805A103(1)5XA(2)

(1) Complete KEMET part number by inserting capacitance tolerance, as applicable as shown in ordering information on page 24.

BP CAPACITANCE TOLERANCE:	BX CAPACITANCE TOLERANCE:
±1%, ±2%, ±5%, ±10%, ±20%	±5%, ±10%, ±20%
(±0.5pF & ±0.25pF tolerances available 1.0 thru 10pF only)	TEMPERATURE CHARACTERISTIC "X"
TEMPERATURE CHARACTERISTIC "G"	

(2) Complete part number by inserting end Metallization, as applicable as shown in ordering information on page 24.

- C — Tin-Coated, Final (SolderGuard II)
- H — Solder-Coated, Final (SolderGuard I)
- T — Silver
- G — Gold Plated
- V — Palladium Silver (Standard-Untinned)
- Z — Other

(3) Capacitance values shown above are standard. Other capacitance values are available upon request.

RATINGS AND PART NUMBER REFERENCE

STYLE C1005

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
1.0	C1005A109(1)2GA(2)
1.1	C1005A119(1)2GA(2)
1.2	C1005A129(1)2GA(2)
1.5	C1005A159(1)2GA(2)
1.6	C1005A169(1)2GA(2)
1.8	C1005A189(1)2GA(2)
2.0	C1005A209(1)2GA(2)
2.2	C1005A229(1)2GA(2)
2.4	C1005A249(1)2GA(2)
2.7	C1005A279(1)2GA(2)
3.0	C1005A309(1)2GA(2)
3.3	C1005A339(1)2GA(2)
3.6	C1005A369(1)2GA(2)
3.9	C1005A399(1)2GA(2)
4.3	C1005A439(1)2GA(2)
4.7	C1005A479(1)2GA(2)
5.1	C1005A519(1)2GA(2)
5.6	C1005A569(1)2GA(2)
6.8	C1005A689(1)2GA(2)
7.5	C1005A759(1)2GA(2)
8.2	C1005A829(1)2GA(2)
9.1	C1005A919(1)2GA(2)
10.0	C1005A100(1)2GA(2)
11.0	C1005A110(1)2GA(2)
12.0	C1005A120(1)2GA(2)
13.0	C1005A130(1)2GA(2)
15.0	C1005A150(1)2GA(2)
16.0	C1005A160(1)2GA(2)
18.0	C1005A180(1)2GA(2)
20.0	C1005A200(1)2GA(2)
22.0	C1005A220(1)2GA(2)
24.0	C1005A240(1)2GA(2)
27.0	C1005A270(1)2GA(2)
30.0	C1005A300(1)2GA(2)
33.0	C1005A330(1)2GA(2)
36.0	C1005A360(1)2GA(2)
39.0	C1005A390(1)2GA(2)
43.0	C1005A430(1)2GA(2)
47.0	C1005A470(1)2GA(2)
51.0	C1005A510(1)2GA(2)
56.0	C1005A560(1)2GA(2)
62.0	C1005A620(1)2GA(2)
75.0	C1005A750(1)2GA(2)
82.0	C1005A820(1)2GA(2)
91.0	C1005A910(1)2GA(2)
100	C1005A101(1)2GA(2)
110	C1005A111(1)2GA(2)
120	C1005A121(1)2GA(2)
130	C1005A131(1)2GA(2)
150	C1005A151(1)2GA(2)
160	C1005A161(1)2GA(2)
180	C1005A181(1)2GA(2)
200	C1005A201(1)2GA(2)
220	C1005A221(1)2GA(2)
240	C1005A241(1)2GA(2)
270	C1005A271(1)2GA(2)
300	C1005A301(1)2GA(2)
330	C1005A331(1)2GA(2)
360	C1005A361(1)2GA(2)
390	C1005A391(1)2GA(2)
430	C1005A431(1)2GA(2)
470	C1005A471(1)2GA(2)
100 VOLT — BP	
510	C1005A511(1)1GA(2)
560	C1005A561(1)1GA(2)
620	C1005A621(1)1GA(2)
680	C1005A681(1)1GA(2)
750	C1005A751(1)1GA(2)
820	C1005A821(1)1GA(2)
50 VOLT — BP	
910	C1005A911(1)5GA(2)
1000	C1005A102(1)5GA(2)
1100	C1005A112(1)5GA(2)
1200	C1005A122(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
330	C1005A331(1)2XA(2)
390	C1005A391(1)2XA(2)
470	C1005A471(1)2XA(2)
560	C1005A561(1)2XA(2)
680	C1005A681(1)2XA(2)
820	C1005A821(1)2XA(2)
1000	C1005A102(1)2XA(2)
1200	C1005A122(1)2XA(2)
1500	C1005A152(1)2XA(2)
1800	C1005A182(1)2XA(2)
100 VOLT — BX	
2200	C1005A222(1)1XA(2)
2700	C1005A272(1)1XA(2)
3300	C1005A332(1)1XA(2)
3900	C1005A392(1)1XA(2)
4700	C1005A472(1)1XA(2)
5600	C1005A562(1)1XA(2)
6800	C1005A682(1)1XA(2)
8200	C1005A822(1)1XA(2)
10,000	C1005A103(1)1XA(2)
50 VOLT — BX	
12,000	C1005A123(1)5XA(2)
15,000	C1005A153(1)5XA(2)
18,000	C1005A183(1)5XA(2)
22,000	C1005A223(1)5XA(2)

(1) Complete KEMET part number by inserting capacitance tolerance, as applicable as shown in ordering information on page 24.

BP CAPACITANCE TOLERANCE:	BX CAPACITANCE TOLERANCE:
±1%, ±2%, ±5%, ±10%, ±20%	±5%, ±10%, ±20%
(±0.5pF & ±0.25pF tolerances available 1.0 thru 10pF only)	TEMPERATURE CHARACTERISTIC "X"
TEMPERATURE CHARACTERISTIC "G"	

(2) Complete part number by inserting end Metallization, as applicable as shown in ordering information on page 24.

- C — Tin-Coated, Final (SolderGuard II)
- H — Solder-Coated, Final (SolderGuard I)
- T — Silver
- G — Gold Plated
- V — Palladium Silver (Standard-Untinned)
- Z — Other

(3) Capacitance values shown above are standard. Other capacitance values are available upon request.

RATINGS AND PART NUMBER REFERENCE
STYLE C1206

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
10.0	C1206A100(1)2GA(2)
11.0	C1206A110(1)2GA(2)
12.0	C1206A120(1)2GA(2)
13.0	C1206A130(1)2GA(2)
15.0	C1206A150(1)2GA(2)
16.0	C1206A160(1)2GA(2)
18.0	C1206A180(1)2GA(2)
20.0	C1206A200(1)2GA(2)
22.0	C1206A220(1)2GA(2)
24.0	C1206A240(1)2GA(2)
27.0	C1206A270(1)2GA(2)
30.0	C1206A300(1)2GA(2)
33.0	C1206A330(1)2GA(2)
36.0	C1206A360(1)2GA(2)
39.0	C1206A390(1)2GA(2)
43.0	C1206A430(1)2GA(2)
47.0	C1206A470(1)2GA(2)
51.0	C1206A510(1)2GA(2)
56.0	C1206A560(1)2GA(2)
62.0	C1206A620(1)2GA(2)
68.0	C1206A680(1)2GA(2)
75.0	C1206A750(1)2GA(2)
82.0	C1206A820(1)2GA(2)
91.0	C1206A910(1)2GA(2)
100	C1206A101(1)2GA(2)
110	C1206A111(1)2GA(2)
120	C1206A121(1)2GA(2)
130	C1206A131(1)2GA(2)
150	C1206A151(1)2GA(2)
160	C1206A161(1)2GA(2)
180	C1206A181(1)2GA(2)
200	C1206A201(1)2GA(2)
220	C1206A221(1)2GA(2)
240	C1206A241(1)2GA(2)
270	C1206A271(1)2GA(2)
300	C1206A301(1)2GA(2)
330	C1206A331(1)2GA(2)
360	C1206A361(1)2GA(2)
390	C1206A391(1)2GA(2)
430	C1206A431(1)2GA(2)
470	C1206A471(1)2GA(2)
100 VOLT — BP	
510	C1206A511(1)1GA(2)
560	C1206A561(1)1GA(2)
620	C1206A621(1)1GA(2)
680	C1206A681(1)1GA(2)
750	C1206A751(1)1GA(2)
820	C1206A821(1)1GA(2)
910	C1206A911(1)1GA(2)
1000	C1206A102(1)1GA(2)
1100	C1206A112(1)1GA(2)
1200	C1206A122(1)1GA(2)
1300	C1206A132(1)1GA(2)
1500	C1206A152(1)1GA(2)
1600	C1206A162(1)1GA(2)
50 VOLT — BP	
1800	C1206A182(1)5GA(2)
2000	C1206A202(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
470	C1206A471(1)2XA(2)
560	C1206A561(1)2XA(2)
680	C1206A681(1)2XA(2)
820	C1206A821(1)2XA(2)
1000	C1206A102(1)2XA(2)
1200	C1206A122(1)2XA(2)
1500	C1206A152(1)2XA(2)
1800	C1206A182(1)2XA(2)
2200	C1206A222(1)2XA(2)
2700	C1206A272(1)2XA(2)
3300	C1206A332(1)2XA(2)
3900	C1206A392(1)2XA(2)
4700	C1206A472(1)2XA(2)
100 VOLT — BX	
5600	C1206A562(1)1XA(2)
6800	C1206A682(1)1XA(2)
8200	C1206A822(1)1XA(2)
10,000	C1206A103(1)1XA(2)
12,000	C1206A123(1)1XA(2)
15,000	C1206A153(1)1XA(2)
50 VOLT — BX	
18,000	C1206A183(1)5XA(2)
22,000	C1206A223(1)5XA(2)
27,000	C1206A273(1)5XA(2)
33,000	C1206A333(1)5XA(2)
39,000	C1206A393(1)5XA(2)
47,000	C1206A473(1)5XA(2)

(1) Complete KEMET part number by inserting capacitance tolerance, as applicable as shown in ordering information on page 24.

BP CAPACITANCE TOLERANCE:	BX CAPACITANCE TOLERANCE:
±1%, ±2%, ±5%, ±10%, ±20%	±5%, ±10%, ±20%
(±0.5pF & ±0.25pF tolerances available 1.0 thru 10pF only)	TEMPERATURE CHARACTERISTIC "X"
TEMPERATURE CHARACTERISTIC "G"	

(2) Complete part number by inserting end Metallization, as applicable as shown in ordering information on page 24.

- C — Tin-Coated, Final (SolderGuard II)
- H — Solder-Coated, Final (SolderGuard I)
- T — Silver
- G — Gold Plated
- V — Palladium Silver (Standard-Untinned)
- Z — Other

(3) Capacitance values shown above are standard. Other capacitance values are available upon request.

RATINGS AND PART NUMBER REFERENCE
STYLE C1210

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
10.0	C1210A100(1)2GA(2)
11.0	C1210A110(1)2GA(2)
12.0	C1210A120(1)2GA(2)
13.0	C1210A130(1)2GA(2)
15.0	C1210A150(1)2GA(2)
16.0	C1210A160(1)2GA(2)
18.0	C1210A180(1)2GA(2)
20.0	C1210A200(1)2GA(2)
22.0	C1210A220(1)2GA(2)
24.0	C1210A240(1)2GA(2)
27.0	C1210A270(1)2GA(2)
30.0	C1210A300(1)2GA(2)
33.0	C1210A330(1)2GA(2)
36.0	C1210A360(1)2GA(2)
39.0	C1210A390(1)2GA(2)
43.0	C1210A430(1)2GA(2)
47.0	C1210A470(1)2GA(2)
51.0	C1210A510(1)2GA(2)
56.0	C1210A560(1)2GA(2)
62.0	C1210A620(1)2GA(2)
68.0	C1210A680(1)2GA(2)
75.0	C1210A750(1)2GA(2)
82.0	C1210A820(1)2GA(2)
91.0	C1210A910(1)2GA(2)
100	C1210A101(1)2GA(2)
110	C1210A111(1)2GA(2)
120	C1210A121(1)2GA(2)
130	C1210A131(1)2GA(2)
150	C1210A151(1)2GA(2)
160	C1210A161(1)2GA(2)
180	C1210A181(1)2GA(2)
200	C1210A201(1)2GA(2)
220	C1210A221(1)2GA(2)
240	C1210A241(1)2GA(2)
270	C1210A271(1)2GA(2)
300	C1210A301(1)2GA(2)
330	C1210A331(1)2GA(2)
360	C1210A361(1)2GA(2)
390	C1210A391(1)2GA(2)
430	C1210A431(1)2GA(2)
470	C1210A471(1)2GA(2)
510	C1210A511(1)2GA(2)
560	C1210A561(1)2GA(2)
620	C1210A621(1)2GA(2)
680	C1210A681(1)2GA(2)
750	C1210A751(1)2GA(2)
820	C1210A821(1)2GA(2)
910	C1210A911(1)2GA(2)
1000	C1210A102(1)2GA(2)
100 VOLT — BP	
1100	C1210A112(1)1GA(2)
1200	C1210A122(1)1GA(2)
1300	C1210A132(1)1GA(2)
1500	C1210A152(1)1GA(2)
1600	C1210A162(1)1GA(2)
1800	C1210A182(1)1GA(2)
2000	C1210A202(1)1GA(2)
2200	C1210A222(1)1GA(2)
2400	C1210A242(1)1GA(2)
2700	C1210A272(1)1GA(2)
3000	C1210A302(1)1GA(2)
3300	C1210A332(1)1GA(2)
50 VOLT — BP	
3600	C1210A362(1)5GA(2)
3900	C1210A392(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
470	C1210A471(1)2XA(2)
560	C1210A561(1)2XA(2)
680	C1210A681(1)2XA(2)
820	C1210A821(1)2XA(2)
1000	C1210A102(1)2XA(2)
1200	C1210A122(1)2XA(2)
1500	C1210A152(1)2XA(2)
1800	C1210A182(1)2XA(2)
2200	C1210A222(1)2XA(2)
2700	C1210A272(1)2XA(2)
3300	C1210A332(1)2XA(2)
3900	C1210A392(1)2XA(2)
4700	C1210A472(1)2XA(2)
5600	C1210A562(1)2XA(2)
6800	C1210A682(1)2XA(2)
8200	C1210A822(1)2XA(2)
10,000	C1210A103(1)2XA(2)
100 VOLT — BX	
12,000	C1210A123(1)1XA(2)
15,000	C1210A153(1)1XA(2)
18,000	C1210A183(1)1XA(2)
22,000	C1210A223(1)1XA(2)
27,000	C1210A273(1)1XA(2)
33,000	C1210A333(1)1XA(2)
50 VOLT — BX	
39,000	C1210A393(1)5XA(2)
47,000	C1210A473(1)5XA(2)
56,000	C1210A563(1)5XA(2)
68,000	C1210A683(1)5XA(2)
82,000	C1210A823(1)5XA(2)
100,000	C1210A104(1)5XA(2)

(1) Complete KEMET part number by inserting capacitance tolerance, as applicable as shown in ordering information on page 24.

BP CAPACITANCE TOLERANCE:
±1%, ±2%, ±5%, ±10%, ±20%
TEMPERATURE CHARACTERISTIC "G"

BX CAPACITANCE TOLERANCE:
±5%, ±10%, ±20%
TEMPERATURE CHARACTERISTIC "X"

(2) Complete part number by inserting end Metallization, as applicable as shown in ordering information on page 24.
- C — Tin-Coated, Final (SolderGuard II)
- H — Solder-Coated, Final (SolderGuard I)
- T — Silver
- G — Gold Plated
- V — Palladium Silver (Standard-Untinned)
- Z — Other

(3) Capacitance values shown above are standard. Other capacitance values are available upon request.

CERAMIC CHIPS/HIGH RELIABILITY

GR 900 SERIES (BP/BX DIELECTRIC)

KEMET

RATINGS AND PART NUMBER REFERENCE

STYLE C1805

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
220	C1805A221(1)2GA(2)
240	C1805A241(1)2GA(2)
270	C1805A271(1)2GA(2)
300	C1805A301(1)2GA(2)
330	C1805A331(1)2GA(2)
360	C1805A361(1)2GA(2)
390	C1805A391(1)2GA(2)
430	C1805A431(1)2GA(2)
470	C1805A471(1)2GA(2)
100 VOLT — BP	
510	C1805A511(1)1GA(2)
560	C1805A561(1)1GA(2)
620	C1805A621(1)1GA(2)
680	C1805A681(1)1GA(2)
750	C1805A751(1)1GA(2)
820	C1805A821(1)1GA(2)
910	C1805A911(1)1GA(2)
1000	C1805A102(1)1GA(2)
1100	C1805A112(1)1GA(2)
1200	C1805A122(1)1GA(2)
1300	C1805A132(1)1GA(2)
1500	C1805A152(1)1GA(2)
50 VOLT — BP	
1600	C1805A162(1)5GA(2)
1800	C1805A182(1)5GA(2)
2000	C1805A202(1)5GA(2)
2200	C1805A222(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
1200	C1805A122(1)2XA(2)
1500	C1805A152(1)2XA(2)
1800	C1805A182(1)2XA(2)
2200	C1805A222(1)2XA(2)
2700	C1805A272(1)2XA(2)
3300	C1805A332(1)2XA(2)
3900	C1805A392(1)2XA(2)
100 VOLT — BX	
4700	C1805A472(1)1XA(2)
5600	C1805A562(1)1XA(2)
6800	C1805A682(1)1XA(2)
8200	C1805A822(1)1XA(2)
10,000	C1805A103(1)1XA(2)
12,000	C1805A123(1)1XA(2)
15,000	C1805A153(1)1XA(2)
50 VOLT — BX	
18,000	C1805A183(1)5XA(2)
22,000	C1805A223(1)5XA(2)
27,000	C1805A273(1)5XA(2)
33,000	C1805A333(1)5XA(2)
39,000	C1805A393(1)5XA(2)
47,000	C1805A473(1)5XA(2)

STYLE C1808

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
330	C1808A331(1)2GA(2)
360	C1808A361(1)2GA(2)
390	C1808A391(1)2GA(2)
430	C1808A431(1)2GA(2)
470	C1808A471(1)2GA(2)
510	C1808A511(1)2GA(2)
560	C1808A561(1)2GA(2)
620	C1808A621(1)2GA(2)
680	C1808A681(1)2GA(2)
750	C1808A751(1)2GA(2)
820	C1808A821(1)2GA(2)
910	C1808A911(1)2GA(2)
1000	C1808A102(1)2GA(2)
1100	C1808A112(1)2GA(2)
1200	C1808A122(1)2GA(2)
1300	C1808A132(1)2GA(2)
1500	C1808A152(1)2GA(2)
100 VOLT — BP	
1600	C1808A162(1)1GA(2)
1800	C1808A182(1)1GA(2)
2000	C1808A202(1)1GA(2)
2200	C1808A222(1)1GA(2)
2400	C1808A242(1)1GA(2)
2700	C1808A272(1)1GA(2)
3000	C1808A302(1)1GA(2)
3300	C1808A332(1)1GA(2)
3600	C1808A362(1)1GA(2)
3900	C1808A392(1)1GA(2)
4300	C1808A432(1)1GA(2)
4700	C1808A472(1)1GA(2)
50 VOLT — BP	
5100	C1808A512(1)5GA(2)
5600	C1808A562(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
2200	C1808A222(1)2XA(2)
2700	C1808A272(1)2XA(2)
3300	C1808A332(1)2XA(2)
3900	C1808A392(1)2XA(2)
4700	C1808A472(1)2XA(2)
5600	C1808A562(1)2XA(2)
6800	C1808A682(1)2XA(2)
8200	C1808A822(1)2XA(2)
10,000	C1808A103(1)2XA(2)
100 VOLT — BX	
12,000	C1808A123(1)1XA(2)
15,000	C1808A153(1)1XA(2)
18,000	C1808A183(1)1XA(2)
22,000	C1808A223(1)1XA(2)
27,000	C1808A273(1)1XA(2)
33,000	C1808A333(1)1XA(2)
50 VOLT — BX	
39,000	C1808A393(1)5XA(2)
47,000	C1808A473(1)5XA(2)
56,000	C1808A563(1)5XA(2)
68,000	C1808A683(1)5XA(2)
82,000	C1808A823(1)5XA(2)
100,000	C1808A104(1)5XA(2)

(1) Complete KEMET part number by inserting capacitance tolerance, as applicable as shown in ordering information on page 24.

BP CAPACITANCE TOLERANCE:
±1%, ±2%, ±5%, ±10%, ±20%
TEMPERATURE CHARACTERISTIC "G"

BX CAPACITANCE TOLERANCE:
±5%, ±10%, ±20%
TEMPERATURE CHARACTERISTIC "X"

(2) Complete part number by inserting end Metallization, as applicable as shown in ordering information on page 24.
- C — Tin-Coated, Final (SolderGuard II)
- H — Solder-Coated, Final (SolderGuard I)
- T — Silver
- G — Gold Plated
- V — Palladium Silver (Standard-Untinned)
- Z — Other

(3) Capacitance values shown above are standard. Other capacitance values are available upon request.

RATINGS AND PART NUMBER REFERENCE

STYLE C1812

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
330	C1812A331(1)2GA(2)
360	C1812A361(1)2GA(2)
390	C1812A391(1)2GA(2)
430	C1812A431(1)2GA(2)
470	C1812A471(1)2GA(2)
510	C1812A511(1)2GA(2)
560	C1812A561(1)2GA(2)
620	C1812A621(1)2GA(2)
680	C1812A681(1)2GA(2)
750	C1812A751(1)2GA(2)
820	C1812A821(1)2GA(2)
910	C1812A911(1)2GA(2)
1000	C1812A102(1)2GA(2)
1100	C1812A112(1)2GA(2)
1200	C1812A122(1)2GA(2)
1300	C1812A132(1)2GA(2)
1500	C1812A152(1)2GA(2)
1600	C1812A162(1)2GA(2)
1800	C1812A182(1)2GA(2)
2000	C1812A202(1)2GA(2)
2200	C1812A222(1)2GA(2)
2400	C1812A242(1)2GA(2)
2700	C1812A272(1)2GA(2)
100 VOLT — BP	
3000	C1812A302(1)1GA(2)
3300	C1812A332(1)1GA(2)
3600	C1812A362(1)1GA(2)
3900	C1812A392(1)1GA(2)
4300	C1812A432(1)1GA(2)
4700	C1812A472(1)1GA(2)
5100	C1812A512(1)1GA(2)
5600	C1812A562(1)1GA(2)
6200	C1812A622(1)1GA(2)
6800	C1812A682(1)1GA(2)
50 VOLT — BP	
7500	C1812A752(1)5GA(2)
8200	C1812A822(1)5GA(2)
9100	C1812A912(1)5GA(2)
10,000	C1812A103(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
6800	C1812A682(1)2XA(2)
8200	C1812A822(1)2XA(2)
10,000	C1812A103(1)2XA(2)
12,000	C1812A123(1)2XA(2)
15,000	C1812A153(1)2XA(2)
18,000	C1812A183(1)2XA(2)
100 VOLT — BX	
22,000	C1812A223(1)1XA(2)
27,000	C1812A273(1)1XA(2)
33,000	C1812A333(1)1XA(2)
39,000	C1812A393(1)1XA(2)
47,000	C1812A473(1)1XA(2)
56,000	C1812A563(1)1XA(2)
68,000	C1812A683(1)1XA(2)
50 VOLT — BX	
82,000	C1812A823(1)5XA(2)
100,000	C1812A104(1)5XA(2)
120,000	C1812A124(1)5XA(2)
150,000	C1812A154(1)5XA(2)
180,000	C1812A184(1)5XA(2)

(1) Complete KEMET part number by inserting capacitance tolerance, as applicable as shown in ordering information on page 24.

BP CAPACITANCE TOLERANCE: ±1%, ±2%, ±5%, ±10%, ±20% (±0.5pF & ±0.25pF tolerances available 1.0 thru 10pF only) TEMPERATURE CHARACTERISTIC "G"

BX CAPACITANCE TOLERANCE: ±5%, ±10%, ±20% TEMPERATURE CHARACTERISTIC "X"

(2) Complete part number by inserting end Metallization, as applicable as shown in ordering information on page 24.

C — Tin-Coated, Final (SolderGuard II)
H — Solder-Coated, Final (SolderGuard I)
T — Silver
G — Gold Plated
V — Palladium Silver (Standard-Untinned)
Z — Other

(3) Capacitance values shown above are standard. Other capacitance values are available upon request.

STYLE C1825

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
2700	C1825A272(1)2GA(2)
3000	C1825A302(1)2GA(2)
3300	C1825A332(1)2GA(2)
3600	C1825A362(1)2GA(2)
3900	C1825A392(1)2GA(2)
4300	C1825A432(1)2GA(2)
4700	C1825A472(1)2GA(2)
5100	C1825A512(1)2GA(2)
5600	C1825A562(1)2GA(2)
100 VOLT — BP	
6200	C1825A622(1)1GA(2)
6800	C1825A682(1)1GA(2)
7500	C1825A752(1)1GA(2)
8200	C1825A822(1)1GA(2)
9100	C1825A912(1)1GA(2)
10,000	C1825A103(1)1GA(2)
11,000	C1825A113(1)1GA(2)
12,000	C1825A123(1)1GA(2)
13,000	C1825A133(1)1GA(2)
15,000	C1825A153(1)1GA(2)
16,000	C1825A163(1)1GA(2)
18,000	C1825A183(1)1GA(2)
50 VOLT — BP	
20,000	C1825A203(1)5GA(2)
22,000	C1825A223(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
10,000	C1825A103(1)2XA(2)
12,000	C1825A123(1)2XA(2)
15,000	C1825A153(1)2XA(2)
18,000	C1825A183(1)2XA(2)
22,000	C1825A223(1)2XA(2)
33,000	C1825A333(1)2XA(2)
39,000	C1825A393(1)2XA(2)
47,000	C1825A473(1)2XA(2)
100 VOLT — BX	
56,000	C1825A563(1)1XA(2)
68,000	C1825A683(1)1XA(2)
82,000	C1825A823(1)1XA(2)
100,000	C1825A104(1)1XA(2)
120,000	C1825A124(1)1XA(2)
150,000	C1825A154(1)1XA(2)
50 VOLT — BX	
180,000	C1825A184(1)5XA(2)
220,000	C1825A224(1)5XA(2)
270,000	C1825A274(1)5XA(2)
330,000	C1825A334(1)5XA(2)
390,000	C1825A394(1)5XA(2)
470,000	C1825A474(1)5XA(2)

RATINGS AND PART NUMBER REFERENCE
STYLE C2225

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BP	
2700	C2225A272(1)2GA(2)
3000	C2225A302(1)2GA(2)
3300	C2225A332(1)2GA(2)
3600	C2225A362(1)2GA(2)
3900	C2225A392(1)2GA(2)
4300	C2225A432(1)2GA(2)
4700	C2225A472(1)2GA(2)
5100	C2225A512(1)2GA(2)
5600	C2225A562(1)2GA(2)
6200	C2225A622(1)2GA(2)
6800	C2225A682(1)2GA(2)
7500	C2225A752(1)2GA(2)
8200	C2225A822(1)2GA(2)
100 VOLT — BP	
9100	C2225A912(1)1GA(2)
10,000	C2225A103(1)1GA(2)
11,000	C2225A113(1)1GA(2)
12,000	C2225A123(1)1GA(2)
13,000	C2225A133(1)1GA(2)
15,000	C2225A153(1)1GA(2)
16,000	C2225A163(1)1GA(2)
18,000	C2225A183(1)1GA(2)
20,000	C2225A203(1)1GA(2)
22,000	C2225A223(1)1GA(2)
50 VOLT — BP	
24,000	C2225A243(1)5GA(2)
27,000	C2225A273(1)5GA(2)

CAPACITANCE pF	KEMET PART NUMBER
200 VOLT — BX	
18,000	C2225A183(1)2XA(2)
22,000	C2225A223(1)2XA(2)
27,000	C2225A273(1)2XA(2)
33,000	C2225A333(1)2XA(2)
39,000	C2225A393(1)2XA(2)
47,000	C2225A473(1)2XA(2)
100 VOLT — BX	
56,000	C2225A563(1)1XA(2)
68,000	C2225A683(1)1XA(2)
82,000	C2225A823(1)1XA(2)
100,000	C2225A104(1)1XA(2)
120,000	C2225A124(1)1XA(2)
150,000	C2225A154(1)1XA(2)
180,000	C2225A184(1)1XA(2)
50 VOLT — BX	
220,000	C2225A224(1)5XA(2)
270,000	C2225A274(1)5XA(2)
330,000	C2225A334(1)5XA(2)
390,000	C2225A394(1)5XA(2)
470,000	C2225A474(1)5XA(2)
560,000	C2225A564(1)5XA(2)
680,000	C2225A684(1)5XA(2)
820,000	C2225A824(1)5XA(2)
1,000,000	C2225A105(1)5XA(2)

(1) Complete KEMET part number by inserting capacitance tolerance, as applicable as shown in ordering information on page 24.

BP CAPACITANCE TOLERANCE:
±1%, ±2%, ±5%, ±10%, ±20%
TEMPERATURE CHARACTERISTIC "G"

BX CAPACITANCE TOLERANCE:
±5%, ±10%, ±20%
TEMPERATURE CHARACTERISTIC "X"

(2) Complete part number by inserting end Metallization, as applicable as shown in ordering information on page 24.
C — Tin-Coated, Final (SolderGuard II)
H — Solder-Coated, Final (SolderGuard I)
T — Silver
G — Gold Plated
V — Palladium Silver (Standard-Untinned)
Z — Other

(3) Capacitance values shown above are standard. Other capacitance values are available upon request.

INTRODUCTION

MIL-C-123 specification covers the general requirement for high reliability, general purpose (BX) and temperature stable (BP) ceramic dielectric fixed capacitors for space, missile, and other high reliability applications. Capacitors covered by MIL-C-123 may be used in critical frequency determining applications, timing circuits, and other applications where absolute stability is required (BP) and in applications where appreciable variations in capacitance with respect to temperature, voltage, frequency, and life can be tolerated (BX).

SCREENING TESTS

Each lot has the following *Preliminary Screening* performed:

1. 100% Ultrasonic Scan
2. In-Process Destructive Physical Analysis
3. 100% visual inspection at a minimum of 10X magnification

The following *Group A* shall be performed on each lot in the following order:

1. **Thermal Shock** — Performed in accordance to MIL-STD-202, Method 107, Condition A, with step 3 being 125°C. Number of cycles shall be 20 (100% of lot).
2. **Voltage Conditioning** — The voltage conditioning shall consist of applying twice the rated voltage to the units at the maximum rated temperature of 125°C for a minimum of 168 hours and a maximum of 264 hours. The voltage conditioning may be terminated at any time during 168 hours to 264 hours time interval that confirmed failures meet the requirements for the PDA during the last 48 hours listed in Table I below (100% of lot).

   Optional Voltage Conditioning (Accelerated Voltage Conditioning): All conditions of the Standard Voltage Conditioning apply with the exception of the increased voltage and the decreased test times. The minimum time duration, T (test), shall be calculated as follows:

   $$T\text{ (test)} = \frac{800}{(E\text{ test} / E\text{ rated})^3}$$

   where: $2 \times E\text{ rated} \leq E\text{ test} \leq 4 \times E\text{ rated}$
   T (test) = Minimum test time in hours
   E test = Applied voltage
   E rated = Rated voltage of the capacitor
3. **Insulation Resistance** — The 125°C measurement with rated voltage applied shall be the lesser of 10,000 megohms or 100 megohm-microfarads (100% of lot).
4. **Dielectric Withstanding Voltage** 250% of the dc rated voltage at 25°C (100% of lot).
5. **Insulation Resistance** — The 25°C measurement with rated voltage applied shall be the lesser of 10,000 megohms or 1000 megohm-microfarads (100% of lot).
6. **Capacitance** must be within specified tolerance at 25°C (100% of lot).

   Capacitance values no more than 5% or .5pF, whichever is greater; for BX characteristic or 1% or .3pF, whichever is greater; for BP characteristic beyond specified tolerance limit shall be removed from the lot but shall not be considered defective for determination of the PDA (Percent Defective Allowable).
7. **Dissipation Factor** shall not exceed 2.5% for X dielectric, 0.15% for G dielectric at 25°C (100% of lot).

   For palladium silver terminated chips, go to step 12 for completion of flow.

   For solder or tin end terminated chips, go to step 8 below.
8. **Final End Termination** is applied (100% of lot).
9. **Visual Examination** is performed (.65 AQL, Level II of Mil-Std. 105)
10. **Voltage Conditioning** — The voltage conditioning shall consist of applying twice the rated voltage to the units at 85 degrees C for 48 hours.
11. **Steps 3-7** shall be repeated.
12. **Percent Defective Allowable (PDA).** The following table lists the PDA requirements for MIL-C-123 Group A:

TABLE 1

KEMET STYLE	MIL STYLE	BURN IN PDA LAST 48 HOURS	PDA OVERALL
C0805Z	CKS51	1 unit or 0.1%	3%
C1210Z	CKS52	1 unit or 0.1%	3%
C1808Z	CKS53	1 unit or 0.1%	3%
C2225Z	CKS54	1 unit or 0.1%	3%

13. **Destructive Physical Analysis** per EIA RS-469 and MIL-C-123 (AQL of lot).

SAMPLE TESTS

The following *Group B* tests shall be performed on samples from each lot, which have been subjected to and have passed Group A inspection:

1. **Thermal Shock** — Performed in accordance to MIL-STD-202, Method 107, Condition A, with step 3 being 125°C. Number of cycles shall be 100.
2. **Life Test per MIL-STD-202, Method 108.** Test temperature and tolerance is +125°C +4, −0°C. Capacitors shall be subjected to 2X rated voltage for 1000 hours.
3. **Humidity, Steady State, Low Voltage per MIL-STD-202, Method 103, Condition A.** Capacitors shall be subjected to an environment of 85°C with 85% relative humidity for 240 hours minimum. Cycling shall not be performed. A dc potential of 1.3 ±0.25 volts shall be applied continuously through a 100,000 ohm resistance to each device under test. At completion, 25°C IR, Cap, and DF are read.
4. **Voltage-temperature Limits** — Capacitance is measured at various temperatures (55°C to 125°C) with and without rated voltage.
5. **Moisture Resistance per MIL-STD-202, Method 106.** There shall be 20 continuous cycles. During the first 10 cycles only, a dc potential of 50 volts shall be applied across the capacitor terminals. Once each day, a check shall be performed to determine whether a capacitor has shorted. Vibration cycle of MIL-STD-202. Method 106, Step 7b shall not be performed. Upon completion of MIL-STD-202, Method 106, Step 6 of the final cycle, capacitors shall be measured for capacitance, dielectric withstanding voltage and insulation resistance.

The following *Group C* tests shall be performed on samples selected from lots that have passed Group A and have been submitted for Group B inspection. Twelve samples shall be selected every two months. Capacitance values manufactured during the period shall be represented as far as practical in at least the approximate ratio of production.

1. Terminal Strength
2. Solderability
3. Resistance to Soldering Heat

All lots shipped must have been subjected to and passed Group A and B testing.

STANDARD PACKAGING FOR MIL-C-123 IS AS FOLLOWS:

C0805Z	chip tray
C1210Z	chip tray
C1808Z	chip tray
C2225Z	chip tray

DATA PACKAGE

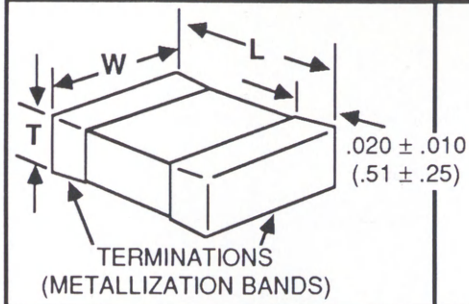
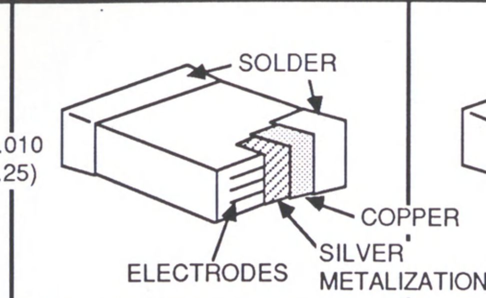
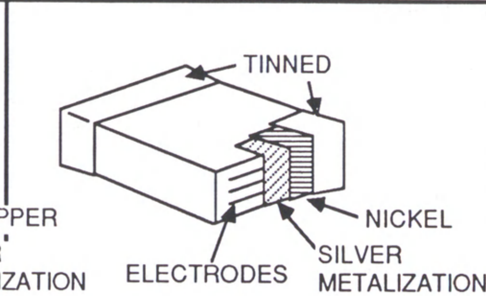
A data package is sent with each shipment which contains:

1. Summary of Group A Testing.
2. Summary of Group B Testing
3. Group B Variables Test Data
4. Final Destructive Physical Analysis Report
5. Certificate of Compliance stating that the ceramic capacitors supplied meet all the requirements of MIL-C-123, the applicable slash sheet(s) and all associated documents.

CERAMIC CHIP/MIL-C-123

KEMET®

CAPACITOR OUTLINE DRAWINGS

PALLADIUM SILVER	"SOLDERGUARD I"	"SOLDERGUARD II"
		
Military Designation - "M" KEMET Designation - "V"	Military Designation - "S" KEMET Designation - "H"	Military Designation - "N" KEMET Designation - "C"

DIMENSIONS—INCHES

CHIP SIZE	MILITARY EQUIVALENT STYLES	L LENGTH	W WIDTH	T THICKNESS MAX.
0805	CKS51	.080 ± .015	.050 ± .015	.055
1210	CKS52	.120 ± .015	.100 ± .015	.065
1808	CKS53	.180 ± .015	.080 ± .015	.065
2225	CKS54	.220 ± .015	.250 ± .015	.070

ORDERING INFORMATION

KEMET PART NUMBER

C 0805 Z 101 K 5 G A C

- **C** — Ceramic
- **0805** — Chip Size: 0805, 1210, 1808, 2225
- **Z** — Specification: Z—MIL-C-123
- **101** — Capacitance: In picoFarad code
- **K** — Capacitance Tolerance: C— ±0.25 pF; D— ±0.5 pF; F— ±1%; J— ±5%; K— ±10%
- **5** — Working Voltage: 5—50
- **G** — Temperature Characteristics (see table)
- **A** — Failure Rate Level (%/1000 hours): A—Standard meets or exceeds MIL-C-55681, level "S"
- **C** — Termination: V = Palladium Silver; C = Tin-coated, Final—(Solderguard II); H = Solder-coated, Final—(Solderguard I)

TEMPERATURE CHARACTERISTICS

KEMET Designator	Military Equivalent	Temp. Range °C	Measured without DC Bias Voltage	Measured with Bias (Rated) Voltage
G (ultra stable)	BP	−55° to +125°	+30 ppm/°C	+30 ppm/°C
X (stable)	BK	−35° to +125°	±15%	+15% −25%

MIL-C-123 MILITARY PART NUMBER

M123 A 10 BX B 472 K S

- **M123** — Military Specification Number
- **A** — Modification Letter: Indicates the latest characteristics of the part in the specification sheet.
- **10** — MIL-C-123 Slash Sheet Number
- **BX** — Temperature Characteristic
- **B** — Voltage: *B* - 50
- **472** — Capacitance Picofarad Code
- **K** — Tolerance: *C* – ± 0.25pF; *D* – ± 0.5pF; *F* – ± 1%; *J* – ± 5%; *K* – ± 10%
- **S** — Termination: *M* - Palladium Silver; *N* - Nickel Guarded Tin; *S* - Copper Guarded Silver

Slash Sheet #	*KEMET Style*	*MIL-C-123 Style*
10	C0805	CKS51
11	C1210	CKS52
12	C1808	CKS53
13	C2225	CKS54

KEMET Designator	Military Equivalent	EIA Equivalent	Capacitance Change With Temperature: Temp. Range/°C	Measured Without DC Bias Voltage	Measured With Bias (Rated Voltage)
G (Ultra Stable)	BP	C0G (NPO)	-55 to +125	+ 30 ppm/°C	+ 30 ppm/°C
X (Stable)	BX	X7R	-55 to +125	±15%	+15% - 25%

CERAMIC CHIP/MIL-C-123 (BP/BX DIELECTRIC)

Ratings and Part Number Reference

CAP. pF	KEMET PART NUMBER	MIL-C-123 PART NUMBER
50 VOLT—BP—C0805 SIZE (MILITARY CKS51)		
1.0	C0805Z109(1)5GA(4)	M123A10BPB1R0(1)(5)
1.1	C0805Z119(1)5GA(4)	M123A10BPB1R1(1)(5)
1.2	C0805Z129(1)5GA(4)	M123A10BPB1R2(1)(5)
1.3	C0805Z139(1)5GA(4)	M123A10BPB1R3(1)(5)
1.5	C0805Z159(1)5GA(4)	M123A10BPB1R5(1)(5)
1.6	C0805Z169(1)5GA(4)	M123A10BPB1R6(1)(5)
1.8	C0805Z189(1)5GA(4)	M123A10BPB1R8(1)(5)
2.0	C0805Z209(1)5GA(4)	M123A10BPB2R0(1)(5)
2.2	C0805Z229(1)5GA(4)	M123A10BPB2R2(1)(5)
2.4	C0805Z249(1)5GA(4)	M123A10BPB2R4(1)(5)
2.7	C0805Z279(1)5GA(4)	M123A10BPB2R7(1)(5)
3.0	C0805Z309(1)5GA(4)	M123A10BPB3R0(1)(5)
3.3	C0805Z339(1)5GA(4)	M123A10BPB3R3(1)(5)
3.6	C0805Z369(1)5GA(4)	M123A10BPB3R6(1)(5)
3.9	C0805Z399(1)5GA(4)	M123A10BPB3R9(1)(5)
4.3	C0805Z439(1)5GA(4)	M123A10BPB4R3(1)(5)
4.7	C0805Z479(1)5GA(4)	M123A10BPB4R7(1)(5)
5.1	C0805Z519(1)5GA(4)	M123A10BPB5R1(1)(5)
5.6	C0805Z569(1)5GA(4)	M123A10BPB5R6(1)(5)
6.2	C0805Z629(1)5GA(4)	M123A10BPB6R2(1)(5)
6.8	C0805Z689(1)5GA(4)	M123A10BPB6R8(1)(5)
7.5	C0805Z759(1)5GA(4)	M123A10BPB7R5(1)(5)
8.2	C0805Z829(1)5GA(4)	M123A10BPB8R2(1)(5)
9.1	C0805Z919(1)5GA(4)	M123A10BPB9R1(1)(5)
10	C0805Z100(2)5GA(4)	M123A10BPB100(2)(5)
11	C0805Z110(2)5GA(4)	M123A10BPB110(2)(5)
12	C0805Z120(2)5GA(4)	M123A10BPB120(2)(5)
13	C0805Z130(2)5GA(4)	M123A10BPB130(2)(5)
15	C0805Z150(2)5GA(4)	M123A10BPB150(2)(5)
16	C0805Z160(2)5GA(4)	M123A10BPB160(2)(5)
18	C0805Z180(2)5GA(4)	M123A10BPB180(2)(5)
20	C0805Z200(2)5GA(4)	M123A10BPB200(2)(5)
22	C0805Z220(2)5GA(4)	M123A10BPB220(2)(5)
24	C0805Z240(2)5GA(4)	M123A10BPB240(2)(5)
27	C0805Z270(3)5GA(4)	M123A10BPB270(3)(5)
30	C0805Z300(3)5GA(4)	M123A10BPB300(3)(5)
33	C0805Z330(3)5GA(4)	M123A10BPB330(3)(5)
36	C0805Z360(3)5GA(4)	M123A10BPB360(3)(5)
39	C0805Z390(3)5GA(4)	M123A10BPB390(3)(5)
43	C0805Z430(3)5GA(4)	M123A10BPB430(3)(5)
47	C0805Z470(3)5GA(4)	M123A10BPB470(3)(5)
51	C0805Z510(3)5GA(4)	M123A10BPB510(3)(5)
56	C0805Z560(3)5GA(4)	M123A10BPB560(3)(5)
62	C0805Z620(3)5GA(4)	M123A10BPB620(3)(5)
68	C0805Z680(3)5GA(4)	M123A10BPB680(3)(5)
75	C0805Z750(3)5GA(4)	M123A10BPB750(3)(5)
82	C0805Z820(3)5GA(4)	M123A10BPB820(3)(5)
91	C0805Z910(3)5GA(4)	M123A10BPB910(3)(5)
100	C0805Z101(3)5GA(4)	M123A10BPB101(3)(5)
110	C0805Z111(3)5GA(4)	M123A10BPB111(3)(5)
120	C0805Z121(3)5GA(4)	M123A10BPB121(3)(5)
130	C0805Z131(3)5GA(4)	M123A10BPB131(3)(5)
150	C0805Z151(3)5GA(4)	M123A10BPB151(3)(5)
160	C0805Z161(3)5GA(4)	M123A10BPB161(3)(5)
180	C0805Z181(3)5GA(4)	M123A10BPB181(3)(5)
200	C0805Z201(3)5GA(4)	M123A10BPB201(3)(5)
220	C0805Z221(3)5GA(4)	M123A10BPB221(3)(5)
240	C0805Z241(3)5GA(4)	M123A10BPB241(3)(5)
270	C0805Z271(3)5GA(4)	M123A10BPB271(3)(5)

CAP. pF	KEMET PART NUMBER	MIL-C-123 PART NUMBER
50 VOLT—BX—C0805 SIZE (MILITARY CKS51)		
330	C0805Z331K5XA(4)	M123A10BXB331K(5)
390	C0805Z391K5XA(4)	M123A10BXB391K(5)
470	C0805Z471K5XA(4)	M123A10BXB471K(5)
560	C0805Z561K5XA(4)	M123A10BXB561K(5)
680	C0805Z681K5XA(4)	M123A10BXB681K(5)
820	C0805Z821K5XA(4)	M123A10BXB821K(5)
1,000	C0805Z102K5XA(4)	M123A10BXB102K(5)
1,200	C0805Z122K5XA(4)	M123A10BXB122K(5)
1,500	C0805Z152K5XA(4)	M123A10BXB152K(5)
1,800	C0805Z182K5XA(4)	M123A10BXB182K(5)
2,200	C0805Z222K5XA(4)	M123A10BXB222K(5)
2,700	C0805Z272K5XA(4)	M123A10BXB272K(5)
3,300	C0805Z332K5XA(4)	M123A10BXB332K(5)
3,900	C0805Z392K5XA(4)	M123A10BXB392K(5)
4,700	C0805Z472K5XA(4)	M123A10BXB472K(5)

To complete part number, insert appropriate tolerance letter:
(1) C = ±0.25 pF, D = ± 0.5 pF
(2) C = ±0.25 pF, J = ±5%, K = ±10%
(3) F = ±1%, J = ±5%, K = ±10%

To complete part number, insert appropriate end metallization:

KEMET:
(4) V = Palladium Silver
C = Tin-coated, Final—Solderguard II
H = Solder-coated, Final—Solderguard I

Military:
(5) M = Palladium Silver
N = Tin-coated, Final
S = Solder-coated, Final

MARKING

Capacitors shall be legibly marked in a contrasting color either by ink or laser marking, with a three-digit capacitance code. When capacitors are too small for three digits, they shall be marked as follows:

Table I

Char.	Code	Char.	Code
A	10	R	33
B	11	S	36
C	12	T	39
D	13	V	43
E	15	W	47
H	16	X	51
I	18	Y	56
J	20	Z	62
K	22	3	68
L	24	4	75
N	27	7	82
O	30	9	91

Table II

Color	Multipliers	Cap. Code Last Digit
Orange	x 0.1	XX9
Black	x 1.0	XX0
Green	x 10.0	XX1
Blue	x 100.0	XX2
Violet	x 1000.0	XX3
Red	x 10000.0	XX4

1. Find first two (2) digits of the cap code in the Code column in Table I.
2. Follow across to Char. column in Table I to determine the character that is to be marked on the chip.
3. Find the last digit of the cap code in the Cap Code column in Table II.
4. Follow across to the Color column in Table II to determine the color of the character.
5. This will be the colored character marked on the chip.
   Example: 109 would be marked with an orange "A."

KEMET

Ratings and Part Number Reference

CAP. pF	KEMET PART NUMBER	MIL-C-123 PART NUMBER
50 VOLT—BP—C1210 SIZE (MILITARY CKS52)		
300	C1210Z301(3)5GA(4)	M123A11BPB301(3)(5)
330	C1210Z331(3)5GA(4)	M123A11BPB331(3)(5)
360	C1210Z361(3)5GA(4)	M123A11BPB361(3)(5)
390	C1210Z391(3)5GA(4)	M123A11BPB391(3)(5)
430	C1210Z431(3)5GA(4)	M123A11BPB431(3)(5)
470	C1210Z471(3)5GA(4)	M123A11BPB471(3)(5)
510	C1210Z511(3)5GA(4)	M123A11BPB511(3)(5)
560	C1210Z561(3)5GA(4)	M123A11BPB561(3)(5)
620	C1210Z621(3)5GA(4)	M123A11BPB621(3)(5)
680	C1210Z681(3)5GA(4)	M123A11BPB681(3)(5)
750	C1210Z751(3)5GA(4)	M123A11BPB751(3)(5)
820	C1210Z821(3)5GA(4)	M123A11BPB821(3)(5)
910	C1210Z911(3)5GA(4)	M123A11BPB911(3)(5)
1,000	C1210Z102(3)5GA(4)	M123A11BPB102(3)(5)
50 VOLT—BX—C1210 SIZE (MILITARY CKS52)		
5,600	C1210Z562K5XA(4)	M123A11BXB562K(5)
6,800	C1210Z682K5XA(4)	M123A11BXB682K(5)
8,200	C1210Z822K5XA(4)	M123A11BXB822K(5)
10,000	C1210Z103K5XA(4)	M123A11BXB103K(5)
12,000	C1210Z123K5XA(4)	M123A11BXB123K(5)
15,000	C1210Z153K5XA(4)	M123A11BXB153K(5)
18,000	C1210Z183K5XA(4)	M123A11BXB183K(5)
22,000	C1210Z223K5XA(4)	M123A11BXB223K(5)
27,000	C1210Z273K5XA(4)	M123A11BXB273K(5)
33,000	C1210Z333K5XA(4)	M123A11BXB333K(5)
47,000	C1210Z473K5XA(4)	M123A11BXB473K(5)
50 VOLT—BP—C1808 SIZE (MILITARY CKS53)		
300	C1808Z301(3)5GA(4)	M123A12BPB301(3)(5)
330	C1808Z331(3)5GA(4)	M123A12BPB331(3)(5)
360	C1808Z361(3)5GA(4)	M123A12BPB361(3)(5)
390	C1808Z391(3)5GA(4)	M123A12BPB391(3)(5)
430	C1808Z431(3)5GA(4)	M123A12BPB431(3)(5)
470	C1808Z471(3)5GA(4)	M123A12BPB471(3)(5)
510	C1808Z511(3)5GA(4)	M123A12BPB511(3)(5)
560	C1808Z561(3)5GA(4)	M123A12BPB561(3)(5)
620	C1808Z621(3)5GA(4)	M123A12BPB621(3)(5)
680	C1808Z681(3)5GA(4)	M123A12BPB681(3)(5)
750	C1808Z751(3)5GA(4)	M123A12BPB751(3)(5)
820	C1808Z821(3)5GA(4)	M123A12BPB821(3)(5)
910	C1808Z911(3)5GA(4)	M123A12BPB911(3)(5)
1,000	C1808Z102(3)5GA(4)	M123A12BPB102(3)(5)
50 VOLT—BX—C1808 SIZE (MILITARY CKS53)		
5,600	C1808Z562K5XA(4)	M123A12BXB562K(5)
6,800	C1808Z682K5XA(4)	M123A12BXB682K(5)
8,200	C1808Z822K5XA(4)	M123A12BXB822K(5)
10,000	C1808Z103K5XA(4)	M123A12BXB103K(5)
12,000	C1808Z123K5XA(4)	M123A12BXB123K(5)
15,000	C1808Z153K5XA(4)	M123A12BXB153K(5)
18,000	C1808Z183K5XA(4)	M123A12BXB183K(5)
22,000	C1808Z223K5XA(4)	M123A12BXB223K(5)
27,000	C1808Z273K5XA(4)	M123A12BXB273K(5)
33,000	C1808Z333K5XA(4)	M123A12BXB333K(5)
47,000	C1808Z473K5XA(4)	M123A12BXB473K(5)
56,000	C1808Z563K5XA(4)	M123A12BXB563K(5)
68,000	C1808Z683K5XA(4)	M123A12BXB683K(5)
82,000	C1808Z823K5XA(4)	M123A12BXB823K(5)
100,000	C1808Z104K5XA(4)	M123A12BXB104K(5)

50 VOLT—BP—C2225 SIZE (MILITARY CKS54)		
1,100	C2225Z112(3)5GA(4)	M123A13BPB112(3)(5)
1,200	C2225Z122(3)5GA(4)	M123A13BPB122(3)(5)
1,300	C2225Z132(3)5GA(4)	M123A13BPB132(3)(5)
1,500	C2225Z152(3)5GA(4)	M123A13BPB152(3)(5)
1,600	C2225Z162(3)5GA(4)	M123A13BPB162(3)(5)
1,800	C2225Z182(3)5GA(4)	M123A13BPB182(3)(5)
2,000	C2225Z202(3)5GA(4)	M123A13BPB202(3)(5)
2,200	C2225Z222(3)5GA(4)	M123A13BPB222(3)(5)
2,400	C2225Z242(3)5GA(4)	M123A13BPB242(3)(5)
2,700	C2225Z272(3)5GA(4)	M123A13BPB272(3)(5)
3,000	C2225Z302(3)5GA(4)	M123A13BPB302(3)(5)
3,300	C2225Z332(3)5GA(4)	M123A13BPB332(3)(5)
3,600	C2225Z362(3)5GA(4)	M123A13BPB362(3)(5)
3,900	C2225Z392(3)5GA(4)	M123A13BPB392(3)(5)
4,300	C2225Z432(3)5GA(4)	M123A13BPB432(3)(5)
4,700	C2225Z472(3)5GA(4)	M123A13BPB472(3)(5)
5,100	C2225Z512(3)5GA(4)	M123A13BPB512(3)(5)
5,600	C2225Z562(3)5GA(4)	M123A13BPB562(3)(5)
6,200	C2225Z622(3)5GA(4)	M123A13BPB622(3)(5)
6,800	C2225Z682(3)5GA(4)	M123A13BPB682(3)(5)
7,500	C2225Z752(3)5GA(4)	M123A13BPB752(3)(5)
8,200	C2225Z822(3)5GA(4)	M123A13BPB822(3)(5)
9,100	C2225Z912(3)5GA(4)	M123A13BPB912(3)(5)
10,000	C2225Z103(3)5GA(4)	M123A13BPB103(3)(5)
50 VOLT—BX—C2225 SIZE (MILITARY CKS54)		
120,000	C2225Z124K5XA(4)	M123A13BXB124K(5)
150,000	C2225Z154K5XA(4)	M123A13BXB154K(5)
180,000	C2225Z184K5XA(4)	M123A13BXB184K(5)
220,000	C2225Z224K5XA(4)	M123A13BXB224K(5)
270,000	C2225Z274K5XA(4)	M123A13BXB274K(5)
330,000	C2225Z334K5XA(4)	M123A13BXB334K(5)
390,000	C2225Z394K5XA(4)	M123A13BXB394K(5)
470,000	C2225Z474K5XA(4)	M123A13BXB474K(5)

To complete part number, insert appropriate tolerance letter:
(1) C = ±0.25 pF, D = ± 0.5 pF
(2) C = ±0.25 pF, J = ±5%, K = ±10%
(3) F = ±1%, J = ±5%, K = ±10%

To complete part number, insert appropriate end metallization:

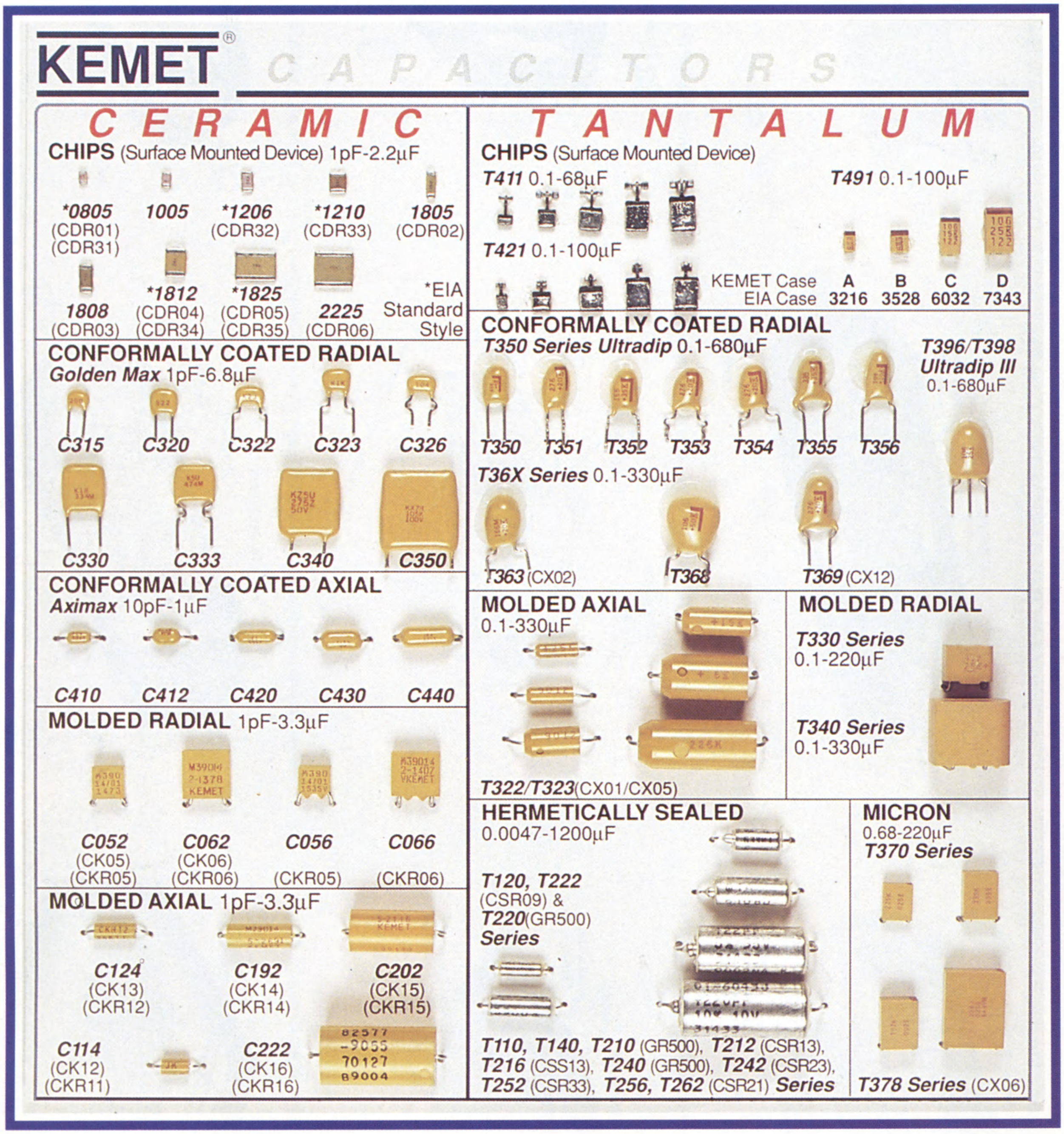
KEMET:
(4) V = Palladium Silver
C = Tin-coated, Final—Solderguard II
H = Solder-coated, Final—Solderguard I

Military:
(5) M = Palladium Silver
N = Tin-coated, Final
S = Solder-coated, Final

35

KEMET® Electronics Corporation

CAPACITORS

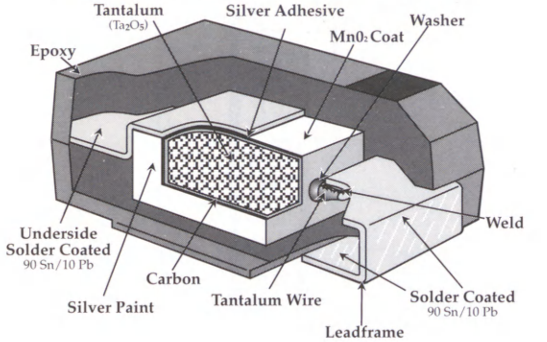


Parts shown are actual size

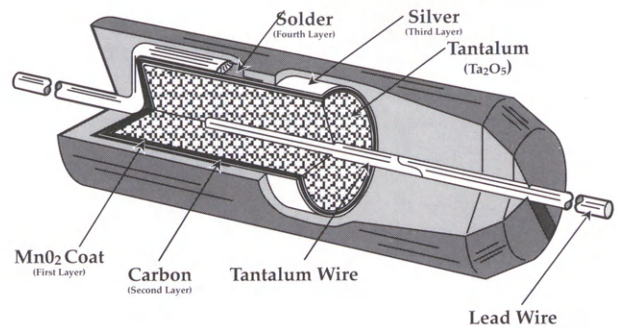
KEMET Electronics Corporation
National Sales Headquarters
P.O. Box 5928 • Greenville, S.C. 29606
Tel 803-963-6300 • TWX: 810-287-2536
FAX: 803-963-6322

Cross Section Drawings of Typical Part Types

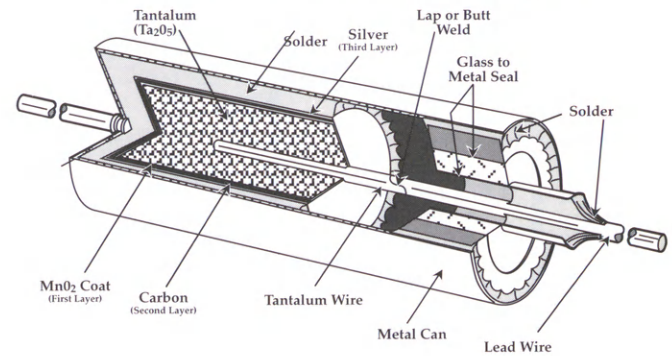
T491 Surface Mount Solid Tantalum Capacitor



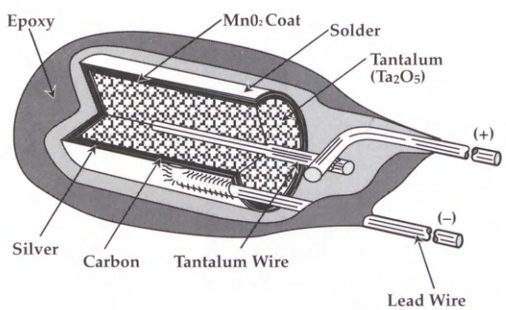
Typical Axial Molded Solid Tantalum Capacitor



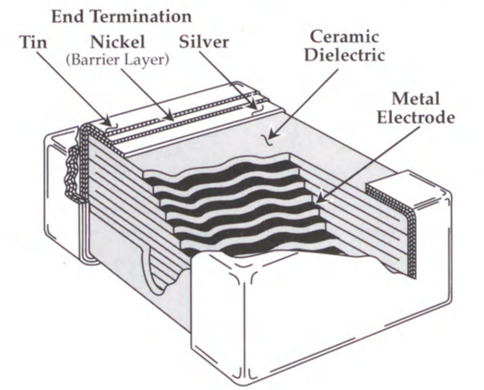
Hermetically Sealed Axial Solid Tantalum Capacitor



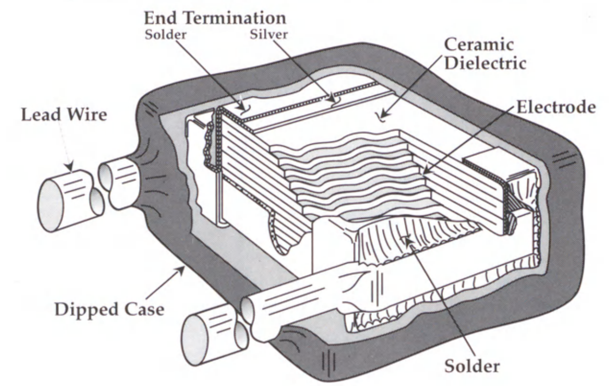
Typical Radial Dipped Solid Tantalum Capacitor



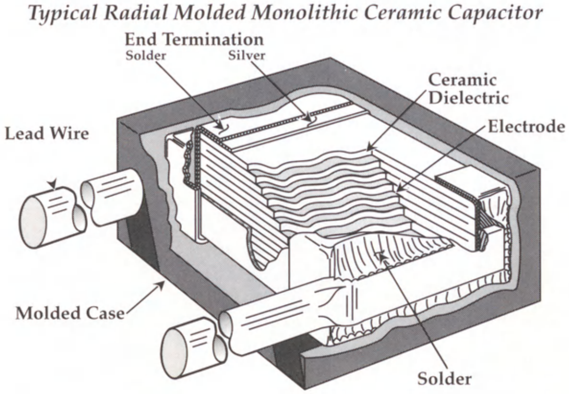
Typical Monolithic Ceramic Chip Capacitor



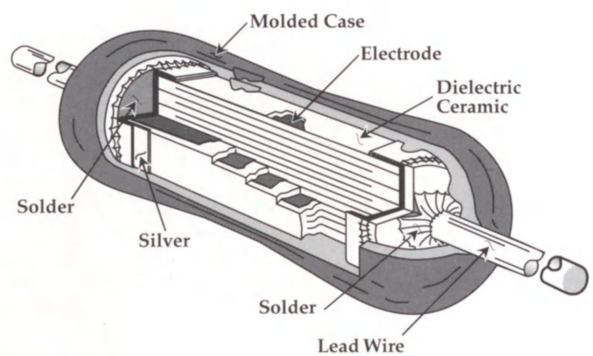
Typical Radial Dipped Monolithic Ceramic Capacitor



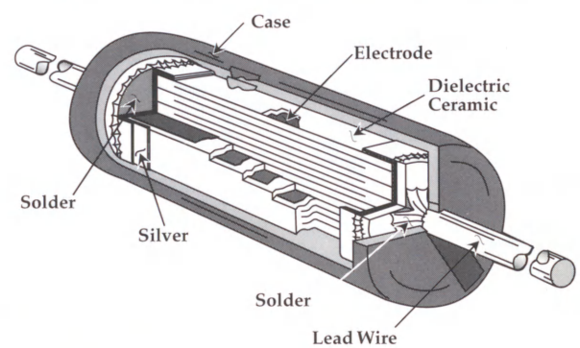
Typical Radial Molded Monolithic Ceramic Capacitor



Typical Axial Conformally Coated Multilayer Ceramic Capacitor



Typical Axial Molded Multilayer Ceramic Capacitor



© KEMET Electronics Corporation • P. O. Box 5928 • Greenville, S. C. 29606 • 803/963-6300 • FAX 803/963-6322

KEMET® Capacitors

KEMET Electronics Corporation

WORLD SALES HEADQUARTERS
Post Office Box 5928 • Greenville, South Carolina 29606 • USA
Tel: (803) 963-6300 • TWX: 810-287-2536 • FAX: (803) 963-6322

KEMET ELECTRONICS CORPORATION
One Civic Plaza, Suite 280
Newport Beach, California 92660 — Phone: (714) 640-9320
Western Region U. S. A. — FAX: (714) 720-9807

KEMET ELECTRONICS CORPORATION
Schaumburg Corporate Center, Suite 110
1515 Woodfield Road
Schaumburg, Illinois 60173 — Phone: (708) 517-1030
Central Region U. S. A. — FAX : (708) 517-1037

KEMET ELECTRONICS CORPORATION
Piedmont Center East, Suite 212, B-137
37 Villa Road
Greenville, South Carolina 29615 — Phone: (803) 242-5789
Eastern Region U. S. A. — FAX: (803) 242-5795

KEMET ELECTRONICS CORPORATION
Waterway Office Tower, Suite 700
433 East Las Colinas Boulevard
Irving, Texas 75039 — Phone: (214) 556-0009
South Central Region U. S. A. — FAX: (214) 401-0254

KEMET ELECTRONICS CORPORATION
301 Edgewater Place, Suite 208
Wakefield, MA 01880 — Phone: (617) 245-4646
New England Region U. S. A. — FAX: (617) 245-1595

KEMET ELECTRONICS CORPORATION
2350 Mission College Blvd., Suite705
Santa Clara, California 95054 — Phone: (408) 986-0424
Northwestern Region U. S. A. — FAX: (408) 986-1442

KEMET ELECTRONICS (Canada) LTD.
Bldg. 2, Suite 105
7145 W. Credit Ave. — Phone: (416) 542-7930
Mississauga, Ontario L5N 6J7 — FAX: (416) 542-7949

KEMET ELECTRONICS (Canada) LTD.
755 boul. St. Jean, Suite 307 — Phone: (514) 694-9525
Pointe Claire, Quebec H9R 5M9 — FAX: (514) 694-9526

KEMET ELECTRONICS S.A.
15 Chemin des Mines — Phone: 41-22-738-4244
CH 1211 Geneva, 20 — Telex: 845-412901 KESA CH
Switzerland — FAX: 41-22-738-3918

KEMET ELECTRONICS GMBH
Hans-Pinsel-Str. L
Postfach 1380 — Phone: 49-89-46-30-01
D 8013 Haar B/Munich — Telex: 524755 KEMET D
Germany — FAX: 49-89-46-04-117

KEMET ELECTRONICS S.A.R.L.
5, Rue De La Corderie
Centra 368 — Phone: 33-1-46-87-70-95
F-94596 Rungis-Cedex — Telex: 263 065 KEMET
France — FAX: 33-1-49-78-06-63

KEMET ELECTRONICS LTD.
20, The Causeway
Bishop's Stortford — Phone: 44-279-757-343
Hertfordshire CM23 2EJ — Telex: 851-818397 KEMET
United Kingdom — FAX: 44-279-757-188

KEMET ELECTRONICS ASIA LTD.
Office A, 17/F
Hamilton Commercial Bldg. — Phone: 852-770-5633
558-560 Nathan Road — Telex: 780-44093 KEMET HX
Kowloon, Hong Kong — FAX: 852-770-5656

KEMET ELECTRONICS MARKETING (S) PTE LTD
32, Maxwell Road
Custom House — Phone: 65-227-2225
#01-02A — Telex: RS 38145 KEMET
Singapore 0160 — FAX: 65-227-2224

KEMET ELECTRONICS CORPORATION., Taiwan Liaison Office
5-10 Floor, No. 148, Sec. 4
Chung-Hsaio E. Rd. — Phone: 886-2-752-8585
Taipei, Taiwan ROC — FAX: 886-2-721-3129

UNICOM INTERNATIONAL CORPORATION
Room 409, Seoul National Univ.
Alumni Assoc. Bldg., 18-2
Dohwa-dong, Mapo-ku — Phone: 82-2-712-5821
Seoul, Korea 121-040 — FAX: 82-2-712-5823

CRUSADER ELECTRONIC COMPONENTS PTY. LTD.-
81 Princess Highway — Phone: 61-2-5163855
St. Peters (Sydney) N.S.W. 2044 — Telex: 790-123993 CRUSAD
Australia — FAX: 61-2-5171189

STC COMPONENTS DISTRIBUTION
Van Dyk Road — Phone: 27-11-899-6111
Boksburg, South Africa — Telex: 960-747-612
Republic of South Africa — FAX: 27-11-892-4609

ELECTRONIC ENTERPRISES (HEAD OFFICE)
Post Bag No. 6367
216, Regal Industrial Estate
Acharya Donde Marg. — Phone: 91-22-413-7096
Sewri, Bombay 400 015 — Telex: 953-1171071
India — FAX: 91-22-413-3341

LANDSEAS ISRAEL LTD.
38, King George Street — Phone: 972-3-299091
Tel Aviv 61230 — Telex: 922-342216
Israel — FAX: 972-3-5282651

HITECH COMERCIAL E INDUSTRIAL LTDA.
Av. Eng, Luiz Carlos Berrini, 801
CJ 111/121 — Phone: 55-11-531-9355
04571 - Sao Paulo, SP — Telex: 391-1153288
Brazil — FAX: 55-11-240-2650

ELKO S. R. L.
AV Belgrano 1661 — Phone: 54-1-453559
(1093 Buenos Aires) — Telex: 390-17561
Argentina — FAX: 54-1-3258819

PANAMERICA DE TECHOLOGICA S. A. de C. V. (PANAMTEK)
Av. Union No. 163-402
Sector Juarez — Phone: 52-36-30-30-29
C.P. 44100, Guadalajara, Jal — Telex: 1773470 ONVIME
Mexico — FAX: 52-36-303115

NOTICE:

Place "011" in front of the above *Phone and FAX Numbers* of Europe and Asia, when dialing from a United States exchange.

NOTE . . . KEMET reserves the right to modify minor details of internal and external construction at any time in the interest of product improvement. **KEMET** does not assume any responsibi[illegible] infringement that might result from the use of **KEMET** Capacitors in potential circuit designs.